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ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

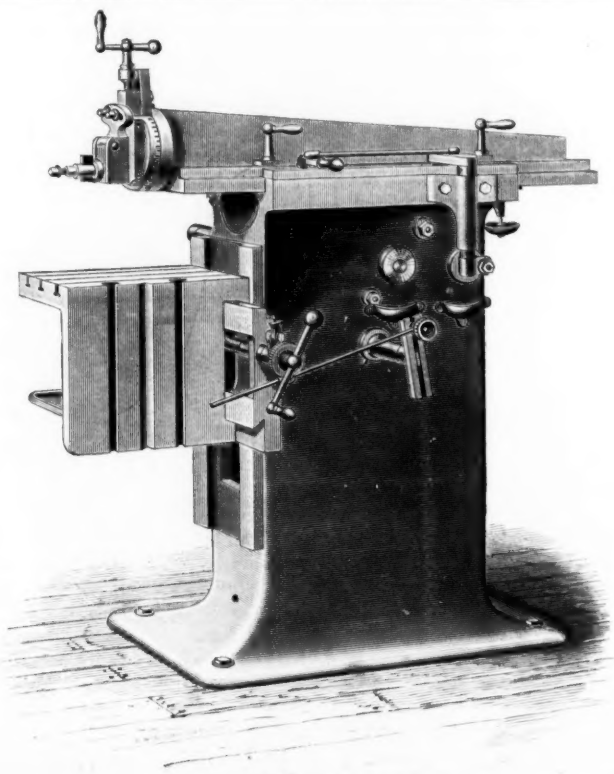
New 24-Inch Shaper.

This machine, built by the Hendey Machine Company, Torrington, Conn., is especially adapted to tool and die-making, and heavy machine work generally. It has a stroke of 24 inches, cross-feed of 21 inches, and will plane a piece 18 inches high.

It has their new reversing motion by which accuracy of stroke is obtained, with the advantage of changing the length of stroke with the machine in motion. The reversing motion has no parts liable to get out of order, and is guaranteed to last as long as the machine.

The vise has steel-faced jaws, is graduated, and will take in 5 inches with jaw in place, or 8 inches without jaw.

Countershaft has 12-inch by 3-inch pulleys, and should run at 150 revolutions. Weight of machine, 2,200 pounds.



NEW 24-INCH SHAPER.

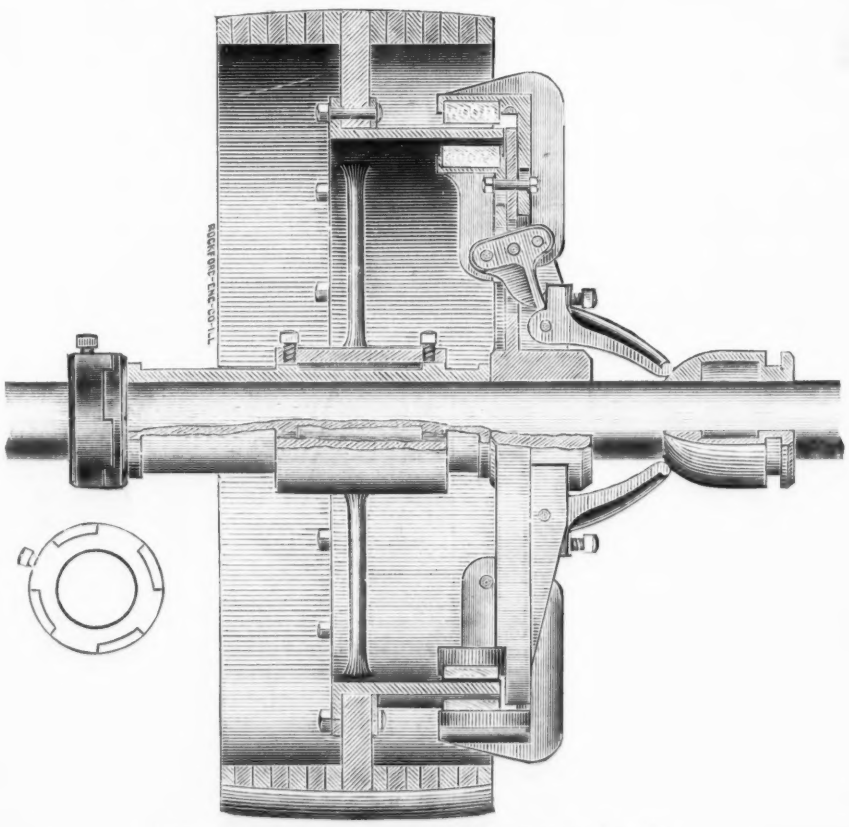
Hill's Friction Clutch.

The constantly-increasing demand for friction clutches has been the means of bringing out a large variety of devices for the purpose, one of which, the invention of H. W. Hill, we illustrate herewith.

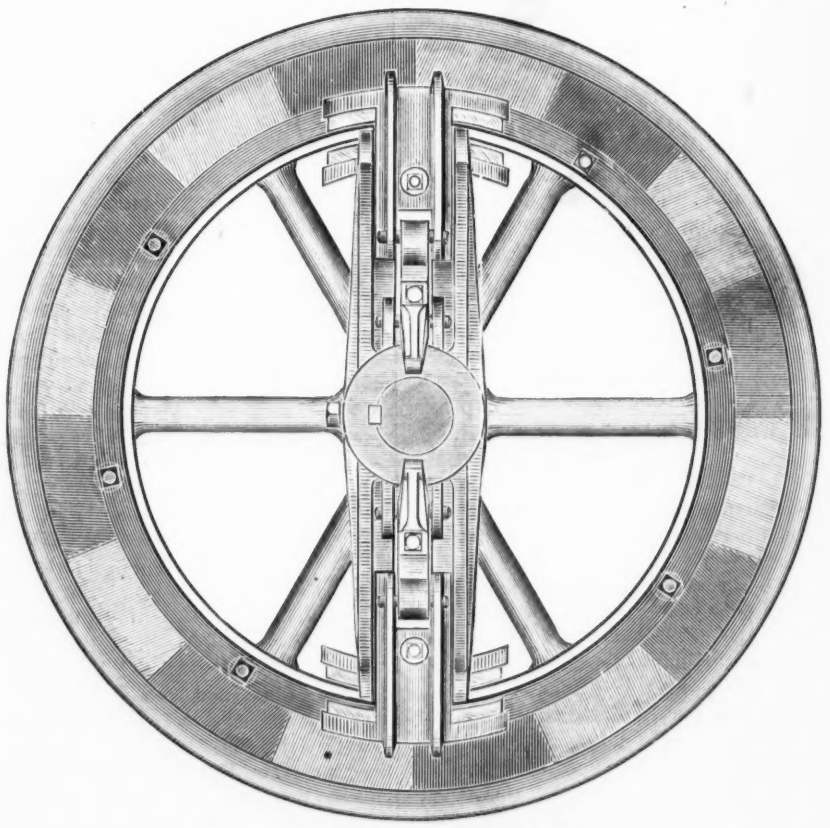
It will be seen, by referring to the engraving, that this clutch has two radial arms, each carrying two jaws, or clutch members, which, when engaged, grip both sides of an annular ring or flange, that is made fast to the pulley. These jaws are shod with seasoned maple, and are arranged to be moved simultaneously in a radial direction both inwardly and outwardly. Each pair of arms are connected together by means of an angle lever, shown in section in the upper radial arm, this lever having its fulcrum midway between the pivotal points of outer and inner jaws; hence, when one jaw moves in either direction, there must be a corresponding movement of the other in an opposite direction.

The outer jaw is longer and somewhat heavier than the inner one; consequently, the centrifugal force exerted on the outer jaw when the clutch is in motion is greater just in proportion as it is heavier, and, as this outer jaw is by centrifugal force thrown outwardly, the other is thrown inwardly, which are the respective positions of each jaw when the clutch is disengaged.

This construction, and consequent automatic release, obviate the necessity of using any springs except in case of very slow speeds—say below 75 revolutions per minute—and then the centrifugal force assists, so that only a light spring is required. Doing away with the use of heavy springs simplifies the construction, increases the durability, and the operator is enabled to move the clutch by slight pressure on a short lever; a greater clearance between the clutching members is also had.



SECTION AND ELEVATION OF HILL'S FRICTION CLUTCH.



PLAN AND SECTION OF HILL'S FRICTION CLUTCH.

This clutch is adapted to be used as a cut-off coupling, as a means of connecting or disconnecting one portion of a line shaft from the other while in motion, as a clutch in connection with pulleys, gears, sprocket wheels, wire rope sheaves, hoisting apparatus, etc. It may connect countershafts with main line, individual machines with main line, or one part of a machine with another. It is particularly desirable to take the place of tight and loose pulleys, as the machinery may be started as quickly or as gradually as may be desired without straining or fraying the belt, as is the case when a shifting belt is employed.

In the construction of the Hill friction clutch pulley a split or removable hub or pulley bearing is used, which is divided in halves, longitudinally, and babbitted or lined with anti-friction bronze. This sleeve is turned on the outside to fit the enlarged bore of the pulley, and is held in place in the ordinary way by two set screws in the hub of the pulley. With this sleeve is a set collar used as an ordinary set collar on the shaft to hold the pulley in place. This collar is especially made to facilitate the rebabbitting of split sleeve. It will be seen, by referring to cut, that it is also split; but, unlike the sleeve, it is split or parted transversely, so as to form, when separated, two separate collars, each part having dental projections on the sides facing each other, which are turned inside to exactly fit the external ends of split sleeve, when the two parts of sleeve are placed together. When the pulley has been used until it and the eye or bore become much worn, the sleeve, being in halves, is easily taken out of the hub of the pulley without disturbing the shafting; the old or worn babbitt taken out as it would be taken out of a box or journal bearing; then one part of the set collar is separated from the other by sliding it along the shaft

till the sleeve can be placed between the two parts of the collar, and the ends inserted into and between the dental projections of the collar, the two parts of sleeve being thus held firmly and exactly central to the shaft in a position to be babbitted; the whole operation can be performed in a few minutes, after which the babbitt is poured into the sleeve, and the result is an entirely new and perfect bore for the pulley, at small expense of time. This sleeve is also furnished when desired without babbitt, being simply bored out smoothly. It is always made from four to six inches longer than the face width of pulley, and fitted with two brass oilers, one on each side.

The device above described is manufactured and sold exclusively by the Eclipse Wind Engine Company, of Beloit, Wisconsin.

"Every-Day" Centers.

The accompanying cuts represent a pair of convenient centers for ordinary shop requirements. They have a capacity of 16″ in length and 6″ diameter, and weigh 45 pounds. The working parts are reduced to as few pieces as possible. The spindle index, platen and dog clamp are cast in one piece, and retained in position in the head by the clamp bolt, as shown.

The tail center is dove-tailed to slide on the bar or base, and held in position by a clamp bolt, similar to the one in the head. Five index circles—divided into 60, 56, 54, 52, and 48 holes, respectively—are drilled in the index plate. The centers are hardened and ground, and all heads of bolts fit the same wrench. The working parts are all accurately made in duplicate. The plane surfaces are finished in the milling machine, the aim of the manufacturer being to produce an accurate, serviceable tool for small work at the lowest possible cost. They are fitted to be held by bolts in the usual way, or clamped in a vise as shown, in which capacity they are very convenient for taper work, and may be readily used on the planer, milling machine, drill press, or other tools.

They are manufactured by Chas. E. Lipe, Syracuse, N. Y.

A New Light.

Prof. Lowe, well known for his connection with water gas, has been making some notable light experiments with water gas, producing an incandescent light by raising the temperature of metal. An observer describing the experiment, said, "the incandescent light is produced by allowing a lighter jet of the cheap fuel gas to come in contact with a spiral of metal, whose composition has not yet been made public, but which is said to be indestructible. This is heated to a white heat, becoming brilliantly luminous, the gas meanwhile burning apparently without flame. If a cheap light could be produced in this way it would be a very valuable discovery, but we seriously doubt the truth of this secret metal being indestructible under a high temperature.

Where Inferior Iron Was Best.

A gentleman in New York, who carries on a business in galvanizing or zinc-coating metal articles, found that his dipping tanks wore out very rapidly. They were generally made of heavy common tank plate. After less than one year of service the tank would have to be patched, and it would be worn out beyond repair in about two years. The frequent renewals and repairs were expensive, and interfered with the work connected with the business. To avoid the recurring trouble and expense of repairing and renewing tanks, the owner conceived the idea that were the tanks constructed of a superior brand of iron there would be less wear from the action of the acid employed to prevent the fused zinc from evaporating. So he ordered a tank made of the best sligo iron. When finished, this tank cost about double the price of those made from common iron. This tank was put into the same service as the others, and the acid acted on the pure sheets so rapidly that within three months there was not enough of the tank left to patch up.

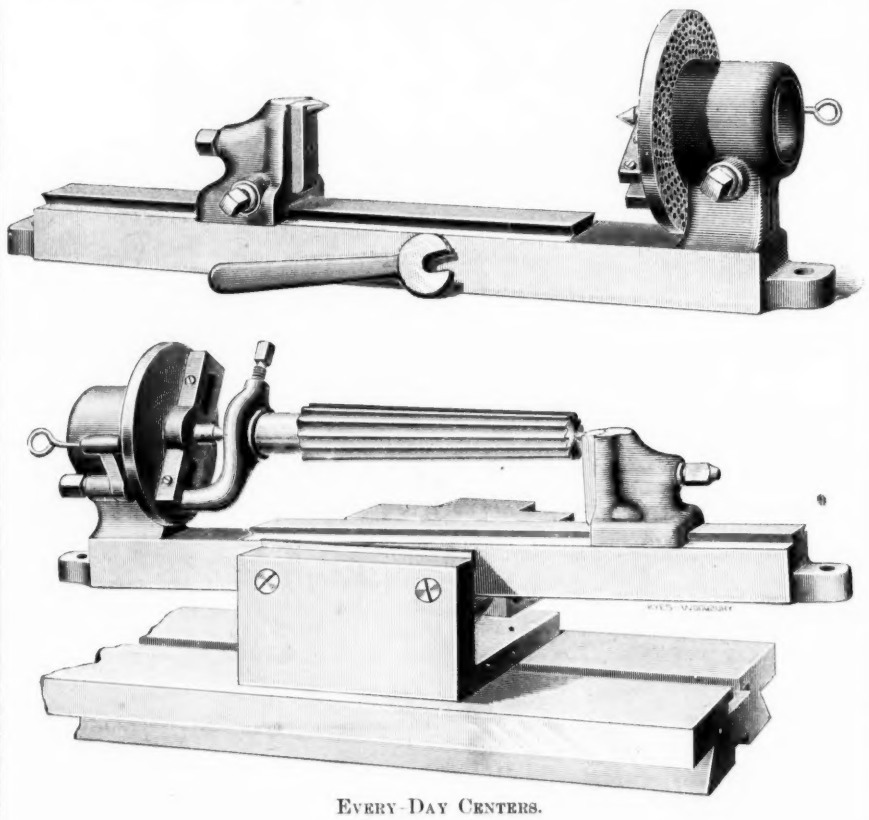
"Grinding and Using Cutting Tools."

By Frank H. Richards.

Your contributor, Mr. James F. Hobart, is a most entertaining writer. His topic in your issue of April 18 is one upon which I have had occasion to do some thinking, and one concerning which I am still, I am glad to say, a learner. I note a number of curious things in Tom's way of grinding and using tools. I have no doubt that Tom is an excellent machinist, and if he came along this way I would certainly give him a job. I would use him as the man did the horse which he could neither sell nor give away. He set himself up as a horse doctor, and kept the horse as a living example of all the diseases that horse-flesh is heir to. And so I could find use for Tom as a bright and shining example of all that is vicious and execrable in tool grinding.

In the first place Tom gets on the wrong side of the grindstone. When I see a fellow dodging around *behind* the stone to grind a tool I always think he is going there because he is ashamed of the job of grinding he is going to perpetrate, and I am sure that he ought to be. You can't grind a tool as fast at the back of the stone. I have often seen it tried. If there is any place in the world where a standard machinist will get excited and impatient it is at the grindstone. One minute at the grindstone is more precious and more to be saved than an hour at the lathe. A man may be lazy anywhere and everywhere else who will always be in a hurry at the grindstone; and so when he gets behind the stone he lays the tool on the rest and begins to crowd it against the stone, and then he begins to crowd harder, and then he braces his feet and begins to crowd as hard as he is able, and pretty soon the heel of the tool catches and lifts up, gouging a big hole in the stone, the man almost tumbling into the trough. I have seen this occur so often, and seen the stone kept in such a wretched condition where the practice is indulged in, that I cant't help wondering where Mr. Hobart has passed his days, or else what kind of grindstone he uses when he says that "the tool can't catch and dig into the stone when grinding from that side of it." I know how peculiarly constituted a genuine machinist is, so I know better than to actually insist that he must grind upon the other side of the stone, but I do all that I can to promote it, and with us it is almost the universal practice. A few surviving compatriots of Tom's would think—and correctly—that they were compelled to learn a new trade if they were obliged to grind their tools in the right way. We have on each of our grindstone frames an adjustable iron rest ¾″ square clamped *close* before the face of the stone, and when a tool is placed upon that to grind, the leverage in front is so slight as compared with the length of the other end of the tool held in the hand that there is no danger of the tool catching.

Any one can readily imagine that there should be a difference in the cutting edge of a tool whether it is ground with the stone running away from it or with the stone running toward it. There is such a difference. The microscope will show it to you. Experience has long since told me, and many more, that the edge of a tool finished with the stone running toward it will cut better and stand longer than when ground with the stone running from it. Tom would seem to have some glimmering notion of this fact too, for do you notice how he goes to grind his thread tool? He gets behind the stone and lays the tool upon the rest *face downward!* I don't know whether he does it with his eyes shut, but he might as well, as not. As he can't see the point of the tool it is entire guesswork upon his part as to what may be happening to it. How many guesses does he make before he gets one side of it ground to his satisfaction? And how good or how bad does it have to be to satisfy him? It must be a terrible strain upon a man's faculties to have to grind a thread tool without seeing it. No wonder that he gets confused, so that when he comes to grind the other side of the V he carries the tool around 60° instead of 120°, which is the correct angular movement for this latitude.



Every-Day Centers.

I would travel quite a little distance to see that post that was worn nearly through by scratching off the feather edges. It would be a great mechanical curiosity, and should be placed in some museum. I hereby engage a photograph of it as soon as any are ready. I haven't seen a feather edge upon a machinists tool in twenty years, and if I should discover such a phenomenon I would return the tool as quickly as possible to the blacksmith and tell him he had forgotten to harden it.

As Tom progresses in his disquisition upon thread tools he gets deeper and deeper, and I follow him with fear and trembling. If I understand Tom's new theory correctly he states, but in other words, that the point of a thread tool must not be radially in advance of the back of it, or the most destructive consequences ensue. "The point of the tool cuts the bottom of the thread before the outer edge is cut, so that tool works just like driving a wedge around a tree just under the bark. It is *sure* to split it off." Now I always advocate and practice the use of a thread tool as a *cutting* tool, and I always, except for brass, have the point of the tool high, and radially considerably in advance of the back of it, and I am *sure* that I never split off a thread in that way. I have often found that in cutting steel I could make a much smoother thread by having a very decided advance to the point of the tool.

Tom gives us a better idea of the cause of his thread splitting off when he says in another place that "a thread tool don't need to have any side rake to cut either left or right hand threads." That accounts for it completely. A thread tool without "side rake" cutting a thread which has a decided "side-rake" will have an excessive clearance upon one side, and the other side will rub and be very well able to split the thread off. In a shop where such a suggestion can pass current they can't be very particular about their screw-cutting. Any one with but a slight experience in screw cutting knows how likely the first thread at the end of a screw is to be thicker than the rest, so that when a nut will pass over this first thread, it is quite apt to be very loose all along the rest of the screw. This can be detected under the most favorable circumstances, and where the "side-rake" of the tool is not properly adjusted it is greatly exaggerated.

Tom sketches upon his boot-leg an ideal thread tool, which might be pretty good if it were not impossible. He can't get "cut" to his thread tool, as other people do, by raising or advancing the point, because that is "sure" to peel all the thread off his screw; and so he proposes to make a tool which he couldn't grind after it was made. He would sink in the top of the tool like the inverted gable of a house. This would give a good "cut" to the sides of the tool, but it would weaken, without improving, the point; and, as I said, it would be impossible to grind. Tom's sketch, marked *J*, showing his way of regrinding thread tools, is a purely ideal production. He never ground a tool in that way, nor anyone else. They frequently make a beginning, but they don't go far before they run for the blacksmith. That system of grinding a little round notch in the top of a tool to give it cut makes more work for the blacksmith than anything else I know of. No wonder that Tom recommends the placing of emery wheels every fifteen feet through the shop. That would give him more cutting corners than a single demoralized grindstone would furnish, and he would need them all.

When Tom cites the twist drill as the unique and perfect type of all that is admirable in a cutting tool, he stirs the profoundest depths of my admiration. Now, surely he knows what he is talking about. The other day I saw a 1½″ twist drill walk right through a solid wrought iron piece 12″ thick. It actually removed 21 cubic inches of metal without grinding—or, let us say that each lip of the drill cut away 11 cubic inches. This, I think, Mr. Tom would accept as a fair and favorable example of twist drill performance. Now, here is a marine engine shaft, 16½″ diameter, which we wish to reduce to 15″ for a certain portion of its length. If we find a tool that will remove metal as successfully as the twist drill cited above (although in turning a shaft we cannot reproduce "all the conditions a twist drill works under") we shall, in turning this shaft, have to regrind the tool every three-eights of an inch. Tom, Tom! did you ever get left? Why, they carry such cuts as that 10′ or 20′ nowadays, without grinding the tool.

Tom has made another discovery worthy of notice. "Lots of boys get left on working brass without oil." I can only say that if you use a tool that is entirely unfit for the purpose, you will, of course, sometimes find that oil will help; but in the big brass manufactories, where they rattle off the brass like wood, because they know how to make and set the tools, they would laugh at the man who proposed oil. To one accustomed to cut iron and steel successfully, a tool best adapted for brass work will never seem right. Using such a tool seems like rubbing or scraping the metal off rather than cutting

it. As a general rule, I would say that tools for brass or bronze should be very hard, with no rake or cut in advance, and with excessive clearance behind, but don't use oil where the metal gives brittle chips. Where it is tough and stringy like copper, I would use tools with a cut to them and less clearance behind, and then I would use oil.

When a man gets into the AMERICAN MACHINIST he challenges remark from every machinist in the country, and I avail myself of the privilege in the interest of correct shop practice. I trust Mr. Hobart will continue to enliven and enlighten us. For thus drawing attention to his interesting articles and promoting their popularity, I trust he will thank me.

Two Plans for Handling Heavy Work—Tom's Center—Lockwood's Rig—Cutting Long Screws—Case-hardening a Bolt-Head.

BY JAMES F. HOBART.

"Skin her up there, Jack;" "Hump her a little;" "Skin her this way a bit;" "Ease her a dot;" "Another hair;" "Just a red hair;" "Now coax the old lady a little dot;" "That's it;" "All ready there;" "Altogether there—now, then, hump her, boys;" "Bust her!" is the racket we hear over in Rusher's shop. "What's the trouble?" No trouble there; only his men are loading that big ten-ton press on a wagon. "Thought a lunatic asylum was holding a caucus," did you? Why, that racket's nothing to what Rusher's men roll out when they are pouring off big work in the foundry.

Let's go over and see them handle that press. There they are. Every man in the shop is fooling around that crane. A $4 man and a $3.50 chap are turning the cranks. The gear-cutter man is cutting a roll, and Rusher himself is everywhere, and all that chin music came right out of his head.

Three cubs and the cleaner were watching the job and pitching washer centers at the gear-cutter man. All the foundry boys were taking it in, too, and the pattern-maker was hunting for a short piece of shafting to put on the wagon for a roll.

Just then she "busted," slid off the roll on to the wagon, and the racket was done. Cost Rusher $5 to load that press, but you can't make him believe it.

Pusher was loading a steam engine the other day, and the foundry boys didn't know it. The pattern-maker took it all in, but he was sitting on a nail keg up-stairs whittling a pattern, and the gear-cutter man didn't seem to care whether that engine was loaded or not.

Pusher and three cubs went to the big crane. Two of the cubs overhauled the crane; another got the chain. Pusher hitched it on, and said, "Go ahead, boys;" "Up another foot;" "Now swing her;" "Lower three inches;" "Another inch down;" "Swing a foot;" "Now all push together, boys;" "All ready on the crane;" "Lower!" "All gone; take off the chain, Jack," said Pusher, as he jumped off the wagon; and the boys went back to work. Time, 10 minutes; cost, 12½ cents.

When Pusher wants to hoist away, he says so, and "up she goes." He knows just what he wants to do, and says just what he means. Rusher don't know what he says or hardly what he wants, and the boys don't care. Every separate chap is running that job, and it would have been done just the same if nothing had been said and Rusher had been out of the way.

Pusher don't "bust things." He says, "Hoist away;" "Swing two feet;" "Up a foot;" "To right ten inches; "Hold on;" "All right;" "Lower away." His men knew just what to do, and the job could be done just as well if it had been pitch dark. None of the "red hair" business for John Pusher. If he wanted $\frac{1}{16}''$, he said so; and if he wanted $\frac{1}{100}''$, he named that fraction, and—got what he wanted.

When Rusher called for "a hair or a dot," he got anything that happened along. Nobody knew what he wanted or what was called for.

Tom was turning a 6″ piece of iron in the big lathe. The iron was about 6′ long. Just as Tom got ready to file a little, the oil gave out, and the dead center began to squeal.

He didn't want to stop the lathe, block up the shaft, run the tail spindle back and oil up. He only had a little more to do; so he said, "Let her squeal." She did squeal, too. He squirted on oil, but it didn't do much good. The center was hot, and the oil all ran off without stopping the music.

Just as Tom got the job done, his belt ran off the countershaft pulley and the lathe stopped. He threw over his shipper handle and climbed up to the belt to put it on; then he went back to his lathe, set the jack under the shaft, and screwed back the tail spindle. The shaft went with it. Tom took hold of the shaft; it was solid; then he took hold of the dog and pulled the shaft toward him. Something snapped, and the shaft was loose. The tail center had broke off short. It was welded into that shaft hard and solid, and had to be drilled out.

Tom don't get caught that way now. He filed a slot in his center, as shown at *A*,

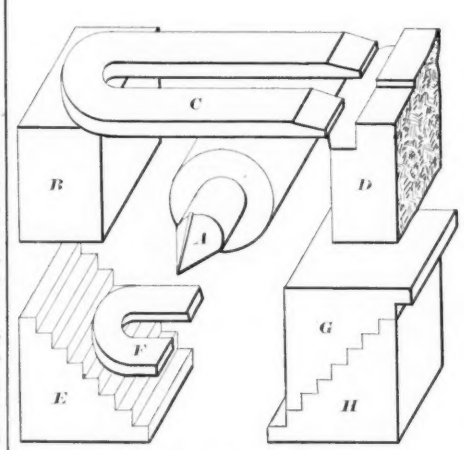


Fig. 2

TOM'S HALF CENTER AND LOCKWOOD'S PLANER BLOCKS.

Fig. 2. He can oil it now. The corners of the groove are rounded off just enough to keep them from cutting the shaft and working like a countersink.

Tom cut the groove on the back side of the center, as shown in the cut. When the tool is cutting, there is no strain on that part of the center; so the slot does no harm on that score.

Lockwood has got a nice shop. He has got nice tools, too, and plenty of them to boot. Lockwood makes printing presses, steam engines and all such truck. He has got lots of kinks and jigs to save time and labor. Some day we will tell about his drilling rig—how he bolts his work on a slotted table, which forms the top of a truck, and how that truck is a turntable, and he can turn the work clear around if he wants to. That truck runs on a little railway, and a big horizontal drill stands beside the track. An upright drill hangs overhead, and Lockwood can bolt a printing press body to that truck, and bore, counter-bore, face up bearings, and ream bolt-holes without loosening the work from the truck. Everything comes true and out of wind when the job is done on Lockwood's rig, and we will get up a sketch of it.

A little rig at the planer was what took our eye. When the planer man wants to plane a piece of iron, he has to bolt it on the planer bed, like *D*, which shows one end of the job. The clamp *C* is put on, and then something must be hunted up to put under the other end of it. Usually a block of wood is picked up, a hunt made for a hand-saw, and a piece cut the right length, like *B*. Sometimes one man will hunt up a big cast nut, or a piece from the scrap heap, or two pieces, and cobble up something to "let go" when he don't want it to. All this ceremony takes lots of time, and it don't bring in any dollars.

Lockwood's rig is simple and cheap. He made a pattern like *E*, and had a lot of castings made from it. The steps are just ½″ square. His man can put the clamps on at just the right height, as at *F*, or if he has got big work, he can use two of the blocks, like *G* and *H*, and set them high or low to suit, and they come in handy in bolting odd shapes to the planer, for he can block up with them to suit.

Another rig is for cutting screws. He cuts lots of 2″ square thread-screws 20′ to 26′ long, and the lathe he does it with makes you think of a rope walk. They used to cut those screws with a single tool, and it took a week. Now he uses four tools, and does the job in less than one day.

A sliding steady rest is rigged, and made double. The bearings are holes in cast iron, just the size of the screw blank. A slide rest is rigged on the steady rest, and carries four tool posts, two in front, and two back of the work. Lockwood sets his tools and uses two screw gauges. He cuts the whole length of that blank, and sets back his tool to reverse, and that brings up the two back tools. They take chips during the return, and when they are thrown out the first two have their innings again.

This rig knocks out all the unlocking nut business you ever heard of. It never makes a mistake, locks the nut wrong and tears off the thread. There is no time lost. No extra motions to go through, except setting the extra tools and keeping them sharp. It works first rate on big work, where the steady rest is not needed. Just set the lathe for ordinary work, run a cut, and while running back, set another tool and post on the back side, and your work goes along twice as fast.

Any screw which will pay to unlock the nut, will pay to set two tools and cut both ways; and in cutting a screw 6″ long, lots of time is lost by waiting for return of the tool, which can be saved first by rigging up a little, and by using a few brains just by the way of novelty. More brains and less time at a job, is what makes our pay "tumble to a raise."

Give a man a bolt with a ¾″ round head, and tell him to file it up "hex." That man will take the bolt in his hand, turn it over, put it in his other hand, and squint at it to see if it is straight. He will turn it, end for end, and then look wistfully at the shaper, but that tool is busy, and he starts for his vise. "Just ¾″ head," he says: "Six sides." That means ⅜″ for each face to show. "Guess I'll take a file just ⅜″ wide, and then I can tell when they are filed enough." He files one face with his three-cornered file, and gets sick of that kind of a measure and file too, so he throws it away and gets a flat file, measures the job with his scale, and goes ahead.

When one side is finished, he turns the bolt in the vise, files the next side nearly down, and tests the angle of this face with the first one. He lays his file flat on the first face, and slips his center gauge along the file until it strikes the second face. He can see just what is wanted, and files to suit.

He files another face or side in the same manner, then commences with the first side and files a place on the other side of it. He knows that if he went clear around that bolt head that he would come out "just where he happened to." He would multiply every error he made, and if the file was not exactly straight, or the gauge was a little "out," then the last side would be anywhere from ¼″ to ½″, and he might spoil the job.

Working both ways, divides the error by two, and he don't take any risks if he can help it. He don't believe in "luck." It don't file up any bolt heads, or grind lathe tools, or draw file bench work for him, for he knows that if he files the six sides just the same size, and makes each angle 120 degrees, then luck can go a begging for all he wants of it.

He gets that bolt filed up in just fifteen minutes, and starts for the forge to case-harden it. Boss can't wait for any burnt leather business, or cow dung, or cast-iron turnings, so he goes for the prussiate of potash. He finds it all gone, box bottom side up, half buried in the cinders, but that bolt is being waited for and must be done in half an hour. Stuck? Not a bit of it. He had half a peck of ideas in that old straw hat. He went to the "glory hole" and got a piece of cast iron that broke with a clean fine grain.

The bolt and cast iron were both put in the fire. He took a white heat on the bolt, and when the cast iron was soft and ready to drop, he rubbed it all over the bolt head. It seemed to melt a little, and form a coating all over the bolt head, and our man took it out of the fire, rubbed off all the surplus iron just as he would the surplus brass if he was brazing, then shoved it into the water tub.

That bolt comes out a little rough where the iron stuck to it, but a few rubs on the emery wheel smooths it up, and that bolt head is so hard, that it makes a file feel tired to look at it.

Difficulties of Railroad Management.

Mr. Theodore Voorhees, superintendent of the Delaware & Hudson Canal Company, in the course of a recent address to railroad men, describes in a striking way the difficult position a conscientious railroad manager is placed in between contending interests. He says: "The path of the railroad manager is indeed beset with thorns. On the one hand, fierce competition has cut rates down to a point barely over the actual cost of the work. On the other hand, the necessities of stockholders demand that dividends shall not be reduced until every other expedient has been tried. Before him a public, irritated by discriminations in rates, the justice of which it is difficult for it to comprehend, clamors for the removal of all discriminations and demands oppressive legislation; while behind and with him stands the great army of railroad employes, who have submitted to reduction after reduction until their pay is barely sufficient for the wants of daily life, whose numbers and wages cannot be any further reduced with safety, and who are working and waiting patiently and hoping for better times. The watchword of a man so placed is economy. The burden of all his instructions is economy. The thought that is ever with him, on the road, at his desk, that follows him to his fireside, is economy. And economy means safe and constantly improving service, better care, better men. The hostile feeling in the community, which we so often see evinced toward the railroads, can best be overcome by constant endeavors to improve the service, afford quick and reliable dispatch for all business, better equipment, better track, courteous and respectful treatment from all employes. This is true economy, and this is what the necessities of the hour demand. In this connection I think all railroad officials will bear cheerful testimony to the value of the work of the Railroad Young Men's Christian Associations. From a strictly utilitarian point of view the work pays. We can see it in the improved tone of all the men, not alone those whose names are on the rolls of the association, but also among their co-laborers. The work of the associations is directly in the interests of economy. A temperate man is always better than one who is intemperate. A Christian temperate man is better than one who is godless. One of the best engineers I ever knew—a man who could be relied upon for any emergency, whose engine never was in trouble, and who was always ready to obey orders and perform whatever duty there was expected of him—never got on his engine without a testament in his pocket, and is now filling a pulpit most acceptably in a Christian church in this State. Such men make good men from a purely business standpoint, and every agency that tends to the development of such men is of value, and deserves the hearty support of the railroads."

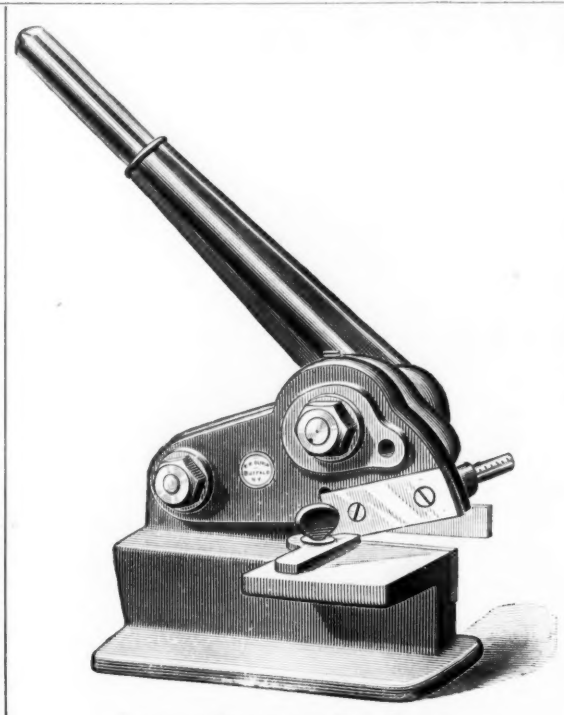
According to the report of boiler explosions for January, published in *The Locomotive* of March, saw-mills keep up their old reputation for bursting their boilers. According to the report, 35 per cent. of the explosions noticed in January were with saw-mill boilers.

Combined Shear and Rod Cutter.

This compact little tool is made by W. W. Oliver, Buffalo, N. Y. To give the necessary power for cutting, an eccentric is used, on which a hardened steel collar rolls against a hardened block.

It will cut sheet metal any length and width, and up to $\frac{3}{16}$ inch thick, and will cut rods up to $\frac{5}{16}$ inch diameter.

It is provided with two gauges, one on the table for angles, the other on the graduated bar for lengths.



COMBINED SHEAR AND ROD CUTTER.

Universal Milling Machine.

The engraving represents a new design of milling machine, lately brought out by E. E. Garvin & Co., New York City.

The block which forms the table bearing swivels 45 degrees each side of a parallel position. At any angle within these limits the feed is automatic, and as smooth-running when set at an angle of 45 degrees as it is when at zero, or in the parallel position, owing to an adjustment which keeps the feed-rod union joints in an approximately straight line.

In milling spirals the feed is automatic, and the practical cutting capacity for work of this character includes a diameter of $10\frac{1}{4}$ inches and a length of $14\frac{1}{2}$ inches, with right or left-hand pitch of spiral, ranging from one turn in $1\frac{1}{3}$ inch to one turn in $133\frac{1}{3}$ inches.

The trip for the feed is automatic, and in position to be quickly and easily adjusted. It acts with the table feeding in either direction. The table bearing is 14 inches long and the table is extra heavy, insuring good results in long work.

The dividing head is compact, has ample base for its height, and can be securely fastened to any part of the table by two bolts in the **T** slot.

For the milling of light cuts with small mills they make a high-speed secondary spindle, shown in small engraving. Its application is direct and calls for no change of parts; it can, it is said, be put upon a machine and set at work in less than ten minutes. It may remain in place without interfering with the regular working of machine. This attachment is so constructed as to be entirely self-contained and applicable to other machines. It will fit without any change their No. 2 power milling machine.

They also manufacture a spring chuck for use with this machine, consisting of a holder and a set of bushings for standard sizes from $\frac{1}{8}$ inch to $\frac{3}{4}$ inch, by sixteenths. It can be used either in the spindle of the machine or in that of the dividing head, to hold either tools or work of diameters within its capacity. It is quickly applied, has an effectual grip, holds the piece central and does not mar it. All bushings are hardened and drawn to a spring temper, and are all interchangeable in the same holder.

The cut that we present of this machine is an accurate delineation of parts and proportion, as it was photographed instead of drawn on the engraver's block.

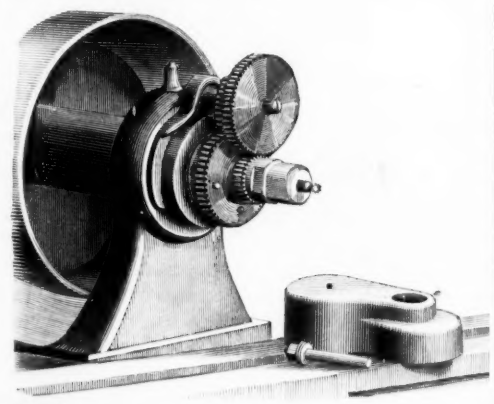
Shown in the cut are the various attachments, extra dials, wrenches, etc., that are furnished with the machine; also the friction counter, allowing reverse motion.

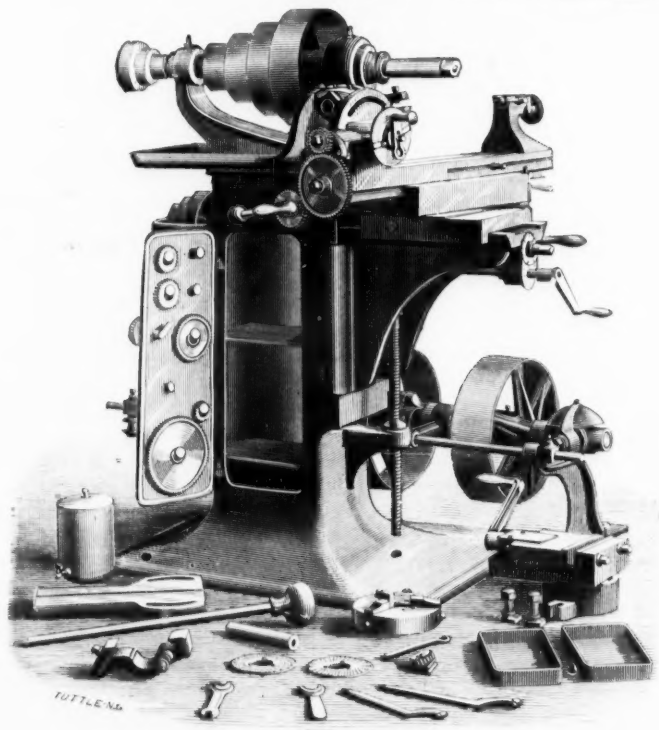
The machine, with countershaft complete, weighs 1,350 pounds.

A Bridgeport, Conn., firm, Wilmot, Hobbs & Co., who are said to have facilities for producing cold rolled iron and steel in ribbons, from five to 300 feet long, to gauges as thin as No. 30 Stubbs, and soft or hard bright as required, are tackling the problem of producing in this country "tinned rolls," as a substitute for tinned plates. By tinning the sheet iron or steel in rolls of any convenient width, instead of in sheets, much hard manipulation will be avoided, and it is hoped that in this form the manufacture of tinned iron and steel may become profitable and practicable in this country. The amount and cost of the tin used in the manufacture of tin plates are of less importance than the cost of manipulation on the plan heretofore employed.

The enormous expense of modern warfare operations may be inferred from the expense incurred by an accident to a heavy steel-lined gun on board the British vessel Inflexible. The original cost of the gun was $50,500, and the expense of putting in a new tube will be $2,000.

A correspondent writing from Burmah to the Glasgow *Herald* gives a very interesting description of the King's iron works, at Sagine, which were erected and nearly completed ten years since. The works were almost ready to start when the King died, and his successor manifested a strong objection to becoming an ironmaster. He refused not only to advance any money to start the works, but declined to allow any one else to carry on the undertaking. The King's ship-building yard is at Mandalay, and at Sagine wrought and cast iron were to be manufactured on a large scale, for the plant includes two large blast furnaces, five rolling mills, punching and shearing machines steam hammers and a foundry. The correspondent gives a graphic picture of the works as they are seen after ten years' silent inactivity. The steam hammer is overgrown by a lovely crimson creeper, one of the blast-furnaces plays flower-pot to a gigantic prickly cactus, and the rolling-mills repose in the shade of luxurious tree ferns. The dry climate has helped to preserve the machinery, which is said to be remarkably free from rust. Anyone anxious to become a Burmese ironmaster might, by journeying to Mandalay, get the right side of the King, and secure the concession of the works for a mere nothing, but before embarking in the enterprise it would be well to count the possible cost, for the rulers of Burmah have rather a bloodthirsty reputation, and sometimes decapitate those who submit objectionable proposals. The man who has courage to start new works in the present condition of trade might have courage to try Mandalay.





UNIVERSAL MILLING MACHINE.

Operating Locomotive Dampers.

BY ANGUS SINCLAIR.

There is a remarkable difference in the way different locomotive engineers regard the value of dampers as attachments to an ash-pan. Some runners act as if they think the openings in the ash-pan are merely holes made to admit air to the fire, and to afford a convenient means of raking out ashes that come from the fire. The doors placed upon these openings are looked upon as superfluities, which troublesome rules require to be closed at certain portions of the road to prevent causing fires. The engineers, however, who have made their business a study understand that locomotive dampers are as useful, when properly managed, as are the dampers of the base-burner stove, which cheers their homes in winter weather. To effect perfect combustion in a fire-box, a certain quantity of oxygen—one of the constituents of common air—is required to mix with the carbon and carburetted hydrogen of the coal. The combustion takes place in certain fixed quantities. If the quantity of air admitted be deficient, a gas of inferior heat power will be generated. When a proper supply of oxygen is given to the fire, the product of combustion is carbonic acid, and about 14,500 units of heat result from the consumption of one pound of carbon under these conditions. When an insufficient supply of oxygen is present, the product of combustion is carbonic oxide, which gives forth only 4,500 heat units to the pound of carbon consumed. This latter condition is very inferior for steam-making, and only comes about in practice when the fire gets badly clinkered up, or when a heavy fire is carried that the air cannot penetrate.

In the fire-boxes of our locomotives where double dampers are the rule, much greater loss of heat is occasioned by excess of air than by the gases not receiving their natural supply of oxygen. The blast from the nozzles creates an impetuous rush of air through the grates, and, when to this is added the rapid currents impelled into the open ash-pan by the violent motion of the train, the fire-box is found to be the center of a furious wind-storm. When the air supply is in excess of that needed for combustion, the surplus affects the steam-producing capabilities of the fire injuriously, since it increases the speed of the gases, lessening the time they are in contact with the water surface, and the violent rush of air reduces the temperature of portions of the fire-box below the heat at which carburetted hydrogen burns.

The excess of this storm can, to a great extent, be regulated by keeping the front damper closed and letting the engine draw its supply of air through the back damper. When the fire begins to get dirty, and the oil passages between the grates become partly choked, the forward damper can be opened with advantage. So long as an engine steams freely with the front damper closed, it is an indication that there is no necessity for keeping it open. With vicious, heavy firing, all the air that can be got through the deep layer of coal is needed to effect indifferently completed combustion, and the man who follows this wasteful practice never gets too much air through the fire; consequently, it is only with moderately light firing that regulation of draft can be intelligently practiced. Running with the front damper open all the time is hard on the leg of the fire-box, and the ever-varying attrition of cold wind on the hot plates is responsible for many a leaky mud ring.

One time I changed off to run another man's engine, retaining his fireman. As we got along over the division, I perceived that he continued to fire heavy, although the train was light and no grades to speak of. I asked the fireman why he did not fire lighter, and he answered, "Because the engine would not steam with a light fire." I told him to try, and soon found out that he was right, for with the light fire the steam gradually went back, although the engine was worked close hooked up. I kept thinking about the matter for a time, and then told the fireman to close the front damper and let the fire run light. He did this, and there was no more trouble for want of steam. The first trouble was that the engine had the nozzles too much contracted, and, when a light fire was carried, with the front damper open, the draft caused by the nozzles and the rush of air into the ash-pan, due to the train's speed, made the velocity of air passing into the fire-box so great that it cooled part of the fire-box gases below the igniting temperature, and a large part of the coal products passed off unconsumed. Many locomotives that will not steam with a light fire are suffering from the same complaint.

F. B. Fletcher, a young man of 24, has been promoted, after two years' work in the shop, to foreman of the screw department of the Ames Manufacturing Company, Chicopee, Mass., in place of A. B. Curtis, who resigned to go into business for himself in Springfield. We learn that since Mr. Fletcher has taken his new position he has made some important changes, enabling him to turn out better work. Some racing bicycles of a kind heretofore made only in England have been turned out under his supervision, which are in no way inferior to the foreign article but have some advantage of their own.

Inventors of Car Couplers.

The genius of car-coupler inventors is not usually restrained by practical considerations in the application of their devices, but most of them do not claim that every other part of the car should be subservient to the coupler. An Arkansas inventor, however, proposes to make the coupler the leading feature of the car. He rigs a line of shafting on the top of the car to do honor to the coupler, and rods and bars and pins and castings are stuck all over, the whole being meant to aid and abet the coupler in keeping cars together or in performing the complex operation of releasing them. It is in fact the most laborious case of car coupling that we have ever seen among the many curiosities for which this line of applied mechanics is noted. We really regret that no railroad company is likely to subject this latest effort to make the tail shake the dog to a practical test, for it would be amusing to witness.

There appears to be a curious fascination about car couplers to attract inventors who are entirely unacquainted with the service. A coupler must stand without sustaining damage. Those with the most impracticable devices are also generally most persistent in urging them upon railroad men. In this connection we learn that Mr. Forney, Secretary of the Master Car Builders' Association, has been compelled, by stress of this particular class of correspondence, to print the following postal card:

71 BROADWAY, ROOM 124,
NEW YORK, 1884.

SIR: Your letter of ———— has been received. The adoption of the following resolution was the only action which was taken at Saratoga with reference to car couplers:

"*Resolved*, That the Executive Committee issue a circular to all the railroad companies represented in this Association, setting forth our plan of retaining Mr. M. N. Forney to devise, conduct and record tests of automatic freight car-couplers, and asking them to signify their willingness to sustain their pro-rata proportion of all expenses incident to such tests."

It has not yet been ascertained whether the railroad companies will be willing to bear the expense of such an investigation, and no one has yet been appointed to make it. Until such an appointment is made, I will have neither the authority nor the inclination to make any tests of car-couplers.

The extent of the correspondence on this subject, and the zeal of inventors of such appliances, threaten to consume more of my time than I can spare, and I am therefore compelled to make use of a printed reply to correspondents, and decline to make examinations or express opinions with reference to the merits of their inventions. Respectfully, M. N. FORNEY.

There is an inventor in Dallas, Texas, who intends to make old newspapers a drug on the market. It is well known among those versed in the mysteries of female apparel that there is an enormous annual consumption of old newspapers in the home manufacture of bustles. Whether it is that newspapers are scarce in Texas, or that this inventor is actuated with hatred to the newspaper publishers, we cannot say, but he has gone and patented a bustle made of steel wire, which is guaranteed to be as effective as ten country newspapers without a tendency to rustle. This will be rough on the country newspapers.

In a recent report to the Secretary of State at Washington, U. S. Consul Eckstein, at the Netherlands, writes:

There is quite a trade here in asbestos steam packing, millboards, and in abestos fireproof paints, &c. Asbestos roofing as a substitute for tin, shingles and other roofing is as yet quite new; but I am informed that experiments made on buildings of the Dutch-Rhenish Railway Company have proven so satisfactory that now there is quite a prospect that this, to me represented to be, cool and strong roofing, will be used more and more in this country, in the near future.

The Curtis Damper Regulator.

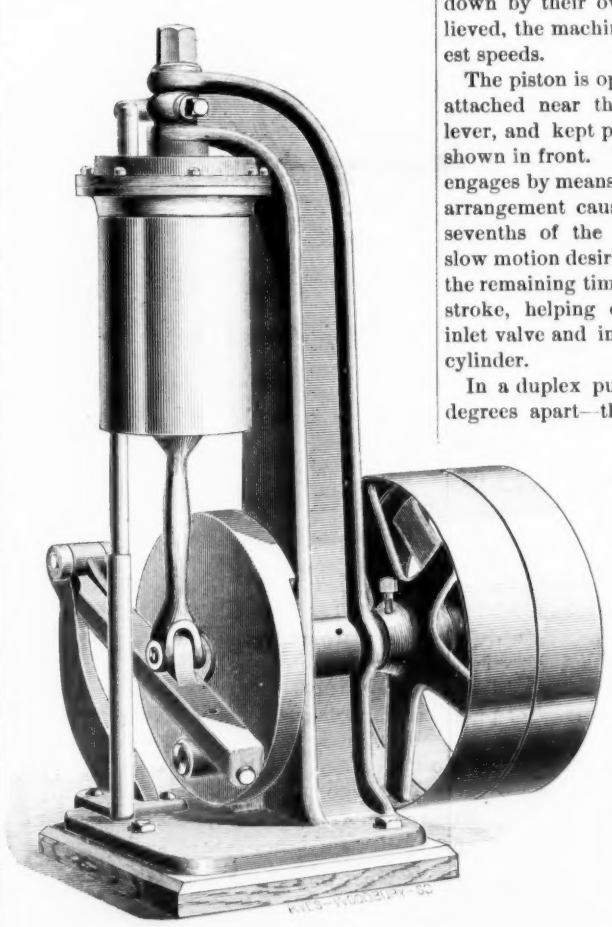
This regulator consists of a composition cylinder, within which is a piston fitted with flexible metallic packing. The piston-rod is connected by a chain, over guide-rolls, to the lever of the damper, on which is hung a weight sufficient to overhaul the piston and open the damper regardless of any ordinary friction.

The motion of the piston is controlled by a metallic diaphragm, which operates the valve, alternately closing and opening the damper, as the boiler-pressure increases or diminishes. The regulator is fastened to the wall of the boiler-room; the pipe *A* is connected to the boiler, and the pipe *B* to the drain, ash-pit or heater.

The normal condition of the damper is to be wide open, the weight holding it in that position. To operate it, a given load—say 60 pounds to the inch—is produced on the regulator diaphragm, by screwing the handle in. When the pressure in the boiler reaches 60 pounds, it lifts this load, and opens the outlet valve, thus relieving the pressure in the space under the piston, which permits the boiler-pressure on top of the piston to force the piston downward, lifting the weight and closing the damper. When the boiler-pressure falls below 60 pounds the outlet valve closes, and the pressure, passing from the top to the bottom of the piston, puts the piston in equilibrium, and allows the weight, slowly settling down, to open the damper, thus controlling the pressure at the desired limit.

The piston may be permitted to move fast or slow, by a cock in the outlet pipe, so that it may be five seconds or five minutes in its entire motion either way.

All the working parts are of the best composition, and in operation have been tested by five years' service, and found to be practically indestructible.



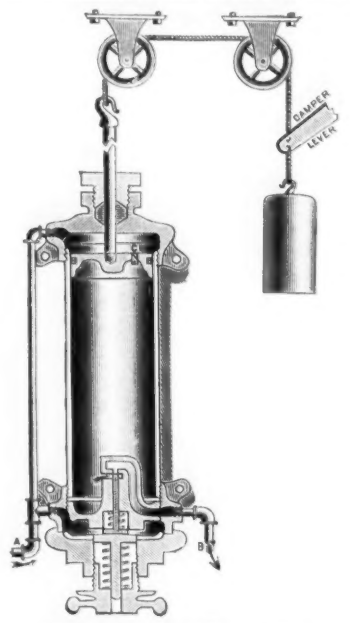
WEINDEL'S STEADY-BLAST PUMP.

There is no waste of steam or water in its operation, except when the pressure is up to, or above, what is desired, and then only when the damper is closing.

The motion of the damper is guaranteed to change from one direction to another on a variation in the steam pressure of one pound.

All the boiler pressure is, with this damper regulator, available to do the work, by which it is claimed that any damper can be controlled, regardless of friction.

A. Aller, 109 Liberty street, New York, is general agent for the sale of these regulators.



CURTIS DAMPER REGULATOR.

Weindel's Steady-Blast Pump.

The engraving represents a single-acting belted air pump, designed and manufactured by H. Weindel, Philadelphia, Pa., for pressures up to 25 pounds to the inch. Its construction combines several features, believed by the inventor to be essential for the satisfactory working of such a machine.

The work is done on the up stroke only. The air enters through a very large inlet valve in piston, and the outlet valve, also of ample size, is arranged centrally in top of cylinder. Both valves are simple leather disks backed by brass ones of same size, and are therefore not open to the objections against metal valves. As these valves fall down by their own weight, as soon as relieved, the machine works light at the slowest speeds.

The piston is operated by a connecting rod attached near the center of a one-armed lever, and kept parallel by the simple guide shown in front. With this lever the crank engages by means of a slide and block. This arrangement causes the piston, during five-sevenths of the revolution, to acquire the slow motion desirable for the purpose, whilst the remaining time is spent in the *quick* down stroke, helping essentially in opening the inlet valve and insuring a complete filling of cylinder.

In a duplex pump—the cranks being 180 degrees apart—the stream of air, it is said, is, without air chamber, practically constant; for a single pump only a small air chamber is required. The resistance being so near uniform, no fly-wheel is necessary, nor slipping of belts noticed. The wear, it is also claimed, is very nearly uniform, making the pumps durable under trying circumstances.

The particular size illustrated has a 4″x6″ cylinder, giving at 75 revolutions, up to which speed the machine runs quietly, nearly 25 gallons of free air per minute, thus furnishing ample blast for a large number of blow pipes. For smelting furnaces a pump of about twice the capacity is used, and, connected with an air injector or blowing jet, will supply sufficient air at eight inches mercury pressure to run two of them.

The *Canadian Magazine*, a publication devoted to "science and industrial arts," in one of its late issues appropriates a half dozen articles from the AMERICAN MACHINIST. United States copyright does not extend to Canada, nor journalistic courtesy to the office of our contemporary. Its abortive attempts to reproduce the engravings supposed to illustrate these articles, are like the efforts of the daily press at portrait printing, only "more so."

LETTERS FROM PRACTICAL MEN.

Perfected Station Indicator.

Editor American Machinist:

In your paper, dated June 7th, you publish an article entitled "Invention of Station Indicators," which, upon perusal, led the present writer to spend some little thought on the subject in endeavoring to work out the problem you there described, and which, it seems, has never yet been fully solved.

I obtained copies of eleven patents on the machine, some of which were entirely worthless, quite a number not automatic, but worked by hand, and some two or three that probably would work correctly. All of these machines were to be placed in one end of the car, and hence could be seen to any advantage only when traveling in a direction facing that end of the car. In order to meet this difficulty, I devised a machine to be located in the center of the car, showing the name of station on both sides of a card, so as to be seen from both directions. The machine was entirely automatic, called the name of station just before reaching it, and the name of next station on leaving this station, whether the train stopped at the station or not.

A full-sized machine was made and tried, and it worked to perfection, and is without doubt, the most complete station Indicator yet invented. But, alas! alas! upon asking the railroad to adopt it, I was informed that it was not at all practicable—that cars, as a rule, run here, there and everywhere, and never on the same routes all the time—and hence my invention, like nine-tenths of other inventions, ends in disappointment.

E. C. HAINES, M. D.

WOODSTOWN, N. J.

Boilers and Boiler Setting—Relative Economy of Coal, Oil and Wood in California.

Editor American Machinist:

I have tried a good many kinds of boilers and different ways of setting, and now that I have made a saving of more than half my fuel I purpose to tell your readers how I have done it.

First then, I have put in a tubular boiler four times as large as my engine, with no dome (preferring to have all my surplus steam room in my boiler). I set the boiler on a stand at back end and hang the front end. I make a full front, with sixteen-inch walls with four-inch hollow space. My boiler is 54-inch diameter and 16 feet long, with 3 inch tubes. I have a 16-inch dead plate and four-foot grates, twenty inches from boiler, back ends four inches the lowest. I put another plate like the dead plate just above the doors and below the flues. I bring in my side walls against the boilers at about the water line. This should be well done, and if so with good buck stays outside it will remain so. I return the fires from the flues over the top of the boiler under an eight-inch arch and an eight-inch space back to end of boiler. Then I make a heavy plate to extend across the whole wall, eight inches from the boiler, on which I place my smoke stack having a flue 16″x30″ and in it a tight fitting damper. I also put a flange all around the out edge of this plate, standing up two inches, to catch all water that may get down the stack. I put into this plate a $\frac{3}{4}$″ pipe to carry off the water. Now from this plate down to the boiler, just even with the end, I fit a door to be removed at any time to clean off the boiler, or to examine the walls on the sides, to be sure they are always kept tight.

For the past two or three years I have been using a portable locomotive boiler and engine of about the capacity I needed when well fired, and for fuel most of the time have used crude petroleum oil with the best oil burners we could make or procure. We have used also both wood and coal, and our experience has been that the relative value of the three for fuel are about alike, with coal at ten dollars per ton, and wood (good hard oak) at ten dollars per cord, and the oil at six cents per gallon. Our oil bill has been about $4.50 per day. Now we are

using about the same amount of power, and use nothing but manure. This costs us nothing, as our livery-stable men gladly accept the privilege of dumping the manure in our yard. For fear that some of your readers that are not acquainted with our climate and soil might think this a great waste, I would say that our farmers think that nature has supplied the soil with all the fertilizer it needs.

I have not tried oil or coal with my new boiler, but I am quite certain we would not use more than one-third as much as we previously had done. It would not take many figures to tell how long it will take to save cost of boiler. However, perhaps I should add that we were using a common slide-valve engine, and now have an Atlas Engine Works' automatic cut-off engine. Now that we are saving more than half our fuel, we would gladly accept the Irishman's conclusion (if we were assured it was good), that if one stove saved half the fuel, then two should save it all.

I am aware that some of your correspondents have urged objections to this kind of boiler setting; but where fuel is as scarce as it is here, it would take a good deal of talk to convince a practical man of the error when he knew he was saving half his fuel bill.

Los Angeles, Cal. M. S. Baker.

Core-Making.

Editor American Machinist:

A quick way to make a core for a hurried job when there is no core-box on hand is to take a piece of gas-pipe, outside diameter the size of core to be made.

Place the pipe perpendicularly on a smooth board, place a small flask around it, ram up with good moulding sand, make a hard mould, draw out the pipe, then fill the mould with very fine parting sand. Let it stand for a few minutes, so as to give the parting sand time to adhere to the sides of the mould. Lift the flask off the board to get rid of the parting sand, replace the flask, then make the core, using a wooden rammer, so as not to disturb the sides of the mould; then cut the sand from around the core, and it is ready for the oven. W. P. Mealor.

Montgomery, Ala.

Blue Lines on White Ground.

Editor American Machinist:

I am amongst the number who have waited to hear from Mr. Harrington about the black lines on white ground, and am disappointed to find that twenty minutes' exposure in clear sun, a chemical developing bath and peculiar bath tub are essentials to the process.

I submit the plan used by the New York Engineering Company to produce a *blue* line on a white ground, which is quite easy and successful, especially with small drawings.

1. For ink, use a saturated solution of citrate of iron and ammonia. It flows freely from the pen, and makes a clean sharp line.

2. See that it is dry and hard by exposure to warm sunshine or fire.

3. Lay drawing on smooth surface and rub *well* all over the paper with the *square* black crayon pencils that are in the market, to form a background upon which lines will appear from subsequent treatment.

4. Put drawing, thus prepared, in cold water for about a minute and the lines will appear in startling whiteness upon the intensely dark ground formed by the chalk.

Lay the still wet *negative*, thus obtained, upon an inclined or vertical surface (not touching any part with the hand) and if any faulty places appear pour water upon the spot from a small height, and allow to dry slowly under the weight of some other drawings, or in the photographic frame, so as to insure its being flat and free from kinks, first removing surplus water with blotting paper.

6. When drawing contains no writing or figures, put the black or face side of the negative toward the sensitive surface of the photographic paper, which will reverse the print but make the lines *sharper;* for the best effect always have glass turned as nearly direct toward sun as possible.

The ordinary writing papers make good negative paper.

A very light solution of some kind of gum, such as sugar or gum arabic, or shellac, fixes the black chalk to the surface of the paper.

It is scarcely necessary to add that the sensitive paper meant to be used under this negative is the usual blue process paper, the copies being made as many and as fast as when the tracing cloth is used.

Mr. Editor, I would like, even at this late day, to pay a slight tribute to the man of all others on this continent who brought the blue process before the American mechanical and architectural public, viz., P. Barnes.

John A. Caldwell.

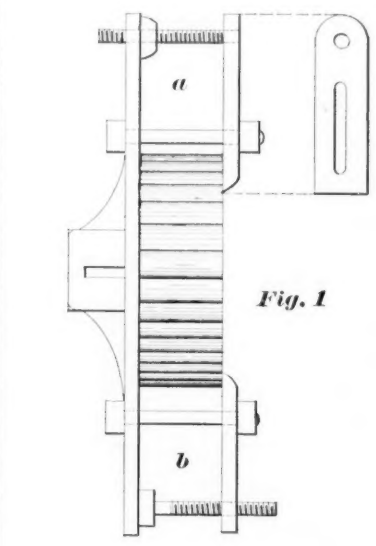


Fig. 1

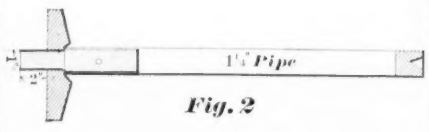


Fig. 2

Handy Shop Contrivances.

Editor American Machinist:

The sketches show two arrangements that I find so convenient in the shop that I offer them in hopes they may benefit some of the readers of the American Machinist.

The strap, Fig. 1, for clamping work to face-plate or chuck is made of ¾ inch by 3½ inch iron; slot in center 1 inch wide, beginning 1 inch from the end. At the other end drill and tap a ¾ inch hole, to take a bolt threaded its entire length. Take a piece of wrought iron about 2 inches diameter and ⅞ inch thick, and tap it out so it will be an easy fit on the bolt. The bolt answers for packing instead of blocks, the extra length of bolt projecting through the face-plate, the nut resting against it, as shown at *a*.

Another plan is shown at *b*, in which the head of the bolt rests against the face-plate, the end of bolt projecting to the front.

The other device, Fig. 2, is for holding work up against the face-plate or chuck. As mine made, the 1¼ inch piece of gas-pipe is 36 is inches long, one end welded up and a deep center countersunk in it. The washer is 5 inches diameter, 1 inch thick, with 1-inch hole through it, beveled so the end of pipe can "wobble" around in it. The wooden piece fits loosely in the pipe, and is held from coming out by a pin. The smaller outer end fits the washer.

By the use of this a piece can be held loosely against the face-plate, the outer end dropped down to true it, without danger of its falling. Matt. Donovan.

Brooklyn, N. Y.

What Constitutes a Machinist.

Editor American Machinist:

I have read with profound interest the article of Mr. Goodyear on new men. The men whom Mr. Goodyear described, both the good and the bad, bear the title "machinist." Let us ask right here, "What constitutes a machinist?" From "Zell's Encyclopedia," we take the following: "One who constructs or fits together the parts of engines and machinery; an adept in the principles of machinery."

If the above holds true (it stands out so forward and plain we cannot deny it), then a great many who call themselves machinists are mistaken in their vocation, and are machinists in name only. How few are adepts in the principles of machinery? How few understand the principle of the steam engine? Then what constitutes a machinist covers a large area, and has a vast meaning attached to it. It requires labor, both physical and mental; as "Samuel Smiles" truly speaks: "All that is great in man comes of labor." Knowledge—the wings wherewith we fly to heaven—is only acquired through labor. Labor, then, to have a true meaning of the business you are following; learn the best and quickest way of doing work, not forgetting to be careful and sure in doing it; never get in the habit, so common in the shop among workmen, of neglecting little things. How often you hear, "That will do?" If this kind of feeling exists in you, you are sunk forever.

Julius C.esar.

The Balance of Rotary Parts of Machinery.

Editor American Machinist:

I have read Mr. Coffin's article with a good deal of care. His analysis would seem to be correct were his premises true. Unfortunately, the experiments here tend to show that the most *important factor* that causes deflection of a flexible axis is not centrifugal force alone (though that is present), but the "moment of inertia of the body." This factor is so great that it totally masks the centrifugal force in many cases of high speed. I have verified this by low speed, but the flexibility of the axis was correspondingly reduced. By the "moment of inertia of the body" is meant the force that causes a shock when a rapidly rotating body is suddenly brought to rest. The body will not, however rotate on its center of gravity except apparently.

As near as I could judge, the center of gravity described a curve something like a circle, while the flexible axis described a still larger curve about the axis of rotation. The experiment was performed with a common scale weight and some rubber cords, which were held horizontally. The action was like this,

as near as I could observe it: *O* is the axis of rotation, which has a variable position. I have represented these paths as circles, which was not by any means the case. (They were anything else but regular curves.) Of course, in such a body, the mark would occur on the light side. It is a difficult experiment to perform, so that the curve can be observed, because the body is soon set to vibrating and brought to rest.

Defiance, O. C. H. Lindenberger.

"A Long Felt Want."

Editor American Machinist:

A tool which is actually needed in the blacksmith shop is a trip-hammer which will strike, at the operator's will, slow and hard, or fast and light.

All trip-hammers with which I am acquainted, patented or unpatented, do the reverse of this; they strike light when they run slow, and hard when they run fast. The iron is biggest when it is first put under the hammer, and as it grows smaller a lesser blow will suffice; will, indeed, be better for the stock, either iron or steel.

Suppose a piece is to be hammered out from two inches square to two inches wide by $\frac{3}{16}$ thick. It is plain that the heavy blows should come at first to move the mass of material, and that light, quick blows are better to finish smoothly and edge up the thin and rapidly cooling plate. Every trip-hammer man has felt the desire to hurry up his strokes as his iron grew cold and the knowledge that he would flaw his works from too heavy blows if he did so has vexed him. I have heard of trip-hammers which were said to have reached this perfection, but have not found these pretensions to be well founded. I can think of ways of doing it, but they involve too much complication and I wouldn't fit up a hammer with anything in that line which I have thought of yet, and wouldn't take one as a gift if some one else had made it. But, although I cannot think of anything which would satisfy me, I am confident that something of the sort is within the possibilities, and throw out this hint to any one who is looking for an opportunity to invent something to supply "a long felt want."

Jacob Vanderbilt O'Brien.

Lagonda, O.

The United States Navy Yards.

(From the *New York Times*)

The fact that the Secretary of the Navy is empowered to construct vessels of war in the United States navy yards hereafter naturally suggests an inquiry as to the facilities of the yards. An official at the Brooklyn Navy Yard yesterday stated that, given an appropriation of 50,000 dollars for improvements, the largest ships and guns could be manufactured there.

"We have a large force of skilled men," he said, "trained in every branch of shipbuilding in wood. These men could easily be converted into iron workers, and soon master all the details of ironclad shipbuilding. It is a positive mistake for the Government to let out its work to irresponsible parties when we have already purchased and paid for every facility required. Our plants are the most extensive in the world. Our engine and machine shop is equipped with all the tools ever invented, and can work 1,000 men. It stands empty, without a man in it except the watchman. Here we can construct the largest and most complicated engines and machinery, and have already manufactured everything needed for our own use.

"Our foundry is one of the largest in the world, and there is no gun in existence which we could not have cast here, either in steel or iron. This vast building, richly equipped for working 300 men, has not a man in it. Here is our spar shed and boat shop. We can build the largest iron and steel spars. We could employ 300 men in each shop, and build fifty small boats and any number of masts at once.

"We have two construction machine shops where we can build the largest turrets, iron plates, and the heaviest iron work. In spite of this fact we sent to England for the iron plates for the turrets of the Miantonomita. The capacity of this shop is 500 men. Our dry dock only is insufficient, being but 365 feet in length, yet capable of speedy enlargement.

"We have a number of steam engines on hand, and enormous storehouses filled with idle material. We have an enormous heavy forge and blacksmith's shop equipped with 4-ton hammers, and room for the largest type. Its capacity is 250 men. The Washington yard has a 20-ton hammer.

"We have two ordnance buildings equipped with all necessary machinery for manufacturing gun carriages and all the adjuncts of guns, and the equipment for packing and shipping munitions of war. That reminds me that Hotchkiss offered our Government the patent and exclusive right of manufacturing his remarkable gun. An incompetent board pronounced the gun worthless in the face of satisfactory experiments. Hotchkiss went to France, which eagerly took the chance offered, and now we have to buy every gun of that pattern from the French, and pay the inventor a royalty, besides. We have also a navigation office, where flags, etc., are made, equipment buildings, provision and clothing departments. The Greely party was, for a wonder, fitted out here.

"At this yard, where 5,000 men can work without elbowing each other, there are but 150 at work. We send our work to private firms, and have to pay for expensive tests and submit to vexatious delays. Work done here is tested as it advances, and can be completed at any given time, owing to our capacity and facilities. Allowing a little time to get in working order, we could turn out twenty of the largest cruisers, one of the largest ironclads, and six of the largest torpedo boats here annually. There are nine navy yards, all about the same size and having about the same facilities. Given one year's time to get into operation, and these nine yards could work 45,000 men, turn out 180 cruisers, nine ironclads, and fifty-four torpedo boats per year, all of the largest type, armed and equipped, and not have to purchase anything outside but raw material.

"You will naturally inquire where men are to be obtained to man a naval fleet, should an emergency require a large force. In this respect the Government has not been idle. The training ships have been educating seamen for years. These seamen have entered the merchant marine, and, as is well known, are the best seamen in the world. Under the contract by which they were trained by the Government they are subject to instant call from any part of the globe, whatever their occupation. Thousands of young men are examined annually at the training ships, and as many as possible accepted for service. They are instructed in gunnery, seamanship, and the elements of common English. When they arrive at the age of 21, if their training is ended, they are permitted to enter the merchant marine as first or second mates. There is no service in the world so thorough as ours, and as a result they are eagerly sought for by the merchant marine. So far as seamen and gunners go, our navy is the best provided in the world, as no other nation has such a thorough and extensive training service."

Independent Condenser for Steam Engines, and Fire Pump Combined.

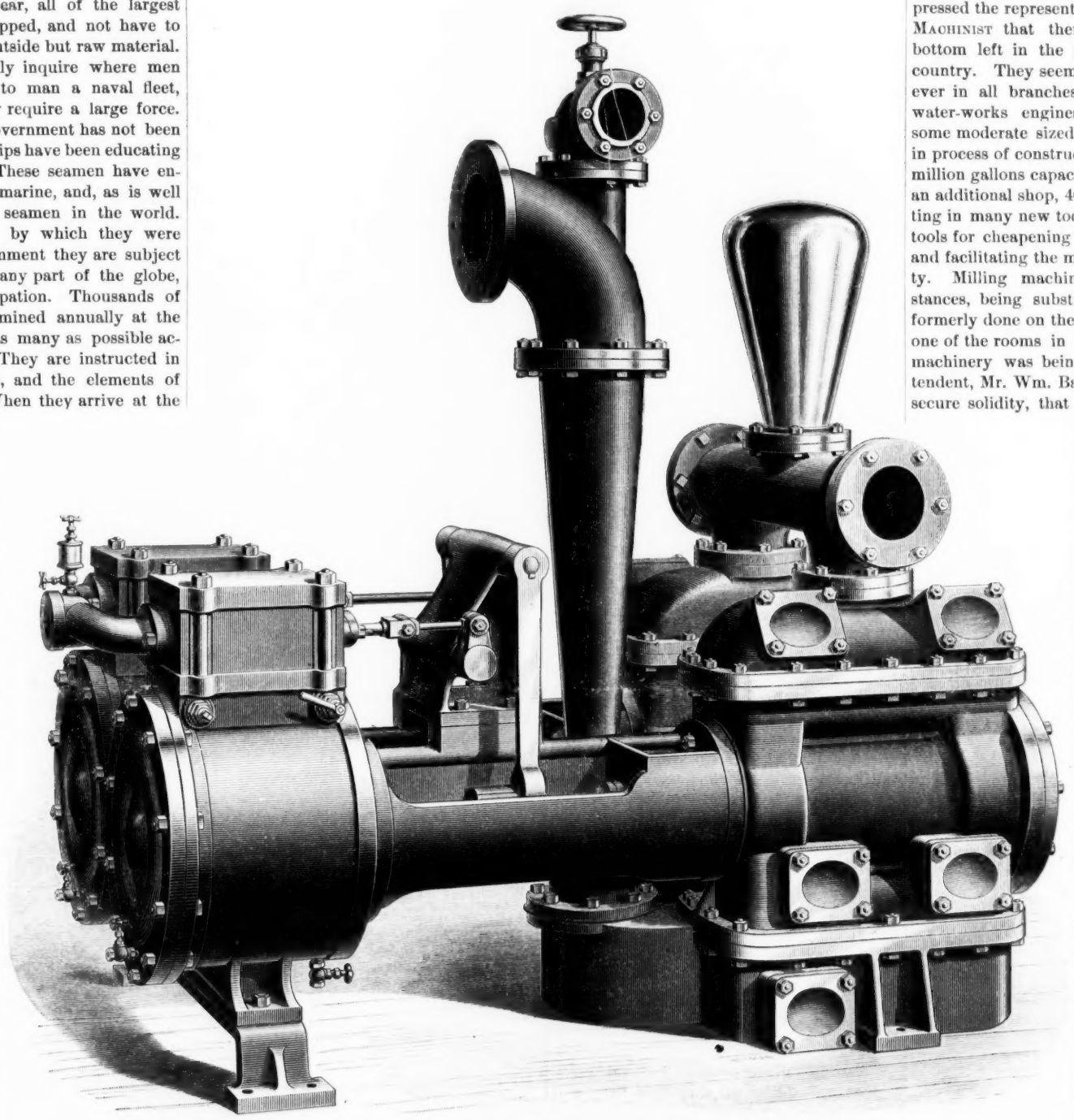
In the AMERICAN MACHINIST of January 5, 1884, we illustrated an independent condenser for steam engines, at that time just brought out by the Worthington Hydraulic Works, 86 and 88 Liberty Street, New York. We illustrate this week a modification of this condenser, which adapts it to be used for a fire pump as well as a condenser.

When fire pumps are placed in a manufactory or other building for use for fire purposes only, it is sometimes found that, standing as they do without being used, they are so disordered as not to work in an emergency, or that it requires so long a time to get them working that they are of but little or no service. With this arrangement the condenser proper is of suitable size for the engine or engines from which the steam is to be condensed, while the steam and water cylinders are made of the desired capacity for fire purposes. For condensing, the pumps are run so as to just take care of the water; then, when required, additional direct suction is given, a full head of steam turned on, and water delivered through one or more connections, as from an ordinary fire pump.

If a fire occurs while the pump is being used in condensing, it is not necessary to make any change in this respect, as in working as a condenser the condensation takes place in the chamber of the vertical branch over the pump, solid water entering the pump, so there is no jar or shock from vapor in the pump cylinders.

If the necessity for a fire pump occurs at night, or when the engine is not running, the pump will take all its water through the additional or lower suction. In any case, the pump being in regular everyday service, is either already running or ready to be instantly started.

As previously illustrated, the condensing water entered the chamber in which the steam is condensed through a rose jet. It was found that, notwithstanding the pains taken in the construction to avoid this, that when there was considerable foreign matter in the water this rose jet was liable to become clogged, and it required lifting out for cleaning. This has been remedied by an arrangement in which the water is divided by being made to pass through slits in the collar of a circular disk, and providing above this a conical valve, the whole operated by the hand-wheel and screw shown at the top. By means of this the water supply can be regulated for the best results, and should there be evidence at any time, by the operation of the condenser, that it is becoming clogged, a turn of the hand-wheel will open the valve so as to instantly wash away all foreign matter, when the hand-wheel can be returned to its normal position.



INDEPENDENT CONDENSER FOR STEAM ENGINES, AND FIRE PUMP COMBINED.

Frederick C. Penney, manufacturer of cushioned helve hammers, Minneapolis, Minn., is about to have a $20,000 brown stone residence, 2½ stories high, erected for him in that city.

Cost of Railroads in Kansas.

The *Railway Register* waxes wroth over an obscure Kansas paper for publishing a statement that the railroads of Kansas which are rated as having cost $100,000 per mile, could be duplicated for $10,000 per mile.

The *Register* says that the actual cost of building each mile of railroad represents but a small portion of the outlay, as the expense of terminal facilities and other charges go to swell up the aggregate cost enormously. The case of the New York, West Shore & Buffalo Railway is cited, to show how charges that do not belong to the building of track may magnify the whole cost.

We think our contemporary was very hard up for argument, when the case of the New York railroad was used as an illustration to apply to railroads built in Kansas. In no State in the Union can railroad building be carried on with so few natural obstacles as in Kansas. The country is level and dry, and land is very cheap. Steel rails and minor attachments are unusually cheap (the *Railway Register* would probably [prefer iron), ties are not high in price, and labor costs less than it has done for years.

Really, we think, a contractor [would make a good thing out of duplicating,' say the Kansas Pacific Railroad track at $10,000 a mile.

Several young men in Brooklyn, formerly pupils of the evening high school, have formed an association for continuing the study of mechanical, architectural and free-hand drawing. The instructors Profs. P. Winter and D. Petri Palmedo, give their services free. The only expense is for rent, light and minor incidentals. Sessions are held six nights every week from 7.45 to 9.30 at room 56, Hamilton Building, 44 Court street, opposite the City Hall. The association started February 24th, and now has 52 members. Other young men who desire to learn drawing can join the association.

The officers of the association are Thomas W. Bunting, President; Walter Crowe, Secretary; David W. Barnes, Financial Secretary; William H. Harned, Treasurer, and Andrew Mechan, Harry A. Leigh and Frank W. Harlin executive committee. The name of the association is "The Pencil of Brooklyn."

A recent visit to the Henry R. Worthington Hydraulic Works at Brooklyn, impressed the representative of the AMERICAN MACHINIST that there is still considerable bottom left in the pump business in this country. They seem to be about as busy as ever in all branches, except it may be on water-works engines. In this direction some moderate sized engines were noticed in process of construction, one being of five million gallons capacity. They are building an additional shop, 40x100 feet, and are putting in many new tools, particularly special tools for cheapening the cost of production, and facilitating the maintenance of uniformity. Milling machines are, in many instances, being substituted for doing work formerly done on the planing machine. In one of the rooms in which new and heavy machinery was being placed, the Superintendent, Mr. Wm. Barr, had taken means to secure solidity, that might be employed to advantage in other instances where the floor is a few inches from the ground. He had two-inch holes bored through the floor a few feet apart, then using gas pipe eight or ten feet long, to get a head, filled under the flooring with cement. It appeared to be about as solid as a stone foundation. Mr. Barr has had made a complete set of dies for cutting packing — rubber and paper — in all the variety of forms and sizes in which it is used on work of this kind. This provides for doing this part of the work very quickly, and makes every piece an exact fit. As cast iron makes dies that are entirely satisfactory for the purpose, they might be advantageously used in many instances and for many purposes when tedious hand-cutting and tying is the rule.

They are building at these works the largest independent condenser we have yet noticed.

It has a capacity of 15,000 gallons of condensing water per minute, and is for use with an 8,000 horse-power engine, building by John Fritz at the Bethlehem (Pa.) Iron Works. All pumps, no matter how small, are thoroughly tested upon being placed in stock. The facilities for testing have been improved, a large room being devoted to this alone. Each size pump has its place for being tested, and by the aid of special couplings steam and water connections are made nearly instantaneously. The foundry facilities are excellent, and some of the heavy castings made are remarkably fine specimens of the moulder's skill.

Mr. Wood, of the recently dissolved firm of Skinner & Wood, gave us a call last week. He has retired from business, and proposes to rest for about two years. Mr. Skinner, the inventor of the engines, continues the business at Erie, Pa.

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NEW YORK, MAY 2, 1885.

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Building an American Navy.

On another page we publish an article on "The National Navy Yards," taken from a recent issue of the *New York Times*. A reporter had interviewed an official of the Brooklyn Navy Yard in regard to the facilities possessed by our navy yards to construct the men-of-war they may be required to build, under powers recently conferred upon the Secretary of the Navy. The information vouchsafed to the *Times* representative was of a most extraordinary character. The "official" asserted that a large force of carpenters, skilled in wooden shipbuilding, was kept at the navy yard, and the men could easily be converted into iron workers. In other respects the Brooklyn Navy Yard was ready to begin iron or steel shipbuilding at once, for it contained machinery suited for constructing all machinery required for ships of war. The plants are the most extensive in the world, and the engine and machine shop is equipped with all the tools ever invented. Verily, this will be a revelation to any mechanical engineer who has inspected the Brooklyn Navy Yard shops.

The interview, no doubt, originated through the existing agitation in favor of transferring Government shipbuilding from private firms and putting it into the navy yards. There is a strong desire manifested all over the country to have a modern navy, and the plan of reviving the navy yards is vaguely regarded as a step in the direction of economy combined with efficiency. We believe Congress has pursued a short-sighted policy in permitting the navy yards to fall into decay, but that was merely a necessary result of the policy pursued of maintaining a peace navy. A peace navy is an assortment of antiquated vessels that eat themselves up in cost of maintenance, while they are neither useful nor ornamental. They form neither the nucleus of an efficient fleet, nor reflect credit upon the nation when cruising in foreign waters. While it is merely an act of public safety to build ships that would be equal to the best possessed by other nations, we think the agitation in favor of taking all naval shipbuilding away from private firms to be wrong, and calculated to inflict serious injury upon important American industries. The talk that the present force in the navy yards could easily be transformed from wood workers to skilled metal workers is simply absurd. No navy yard belonging to this nation is in a position to begin building modern vessels of war without first receiving an entirely new personnel, which would have to be organized; and most of the machinery adapted for wooden shipbuilding would have to be replaced with very expensive appliances, suitable for working iron and steel. The artisans who do the principal work of modern shipbuilding are boiler makers, blacksmiths, and machinists, and for them the work is a specialty that requires new special training. If the policy should be followed of building up a modern navy and doing the work in the navy yards, the business can be successfully carried on only by drawing the skilled workmen away from private firms who are already in the business.

The navy yards ought to be reorganized to do all the repairs to the ships of a modern navy, and they might be employed doing a little new building; but the principal operations of building up a new navy ought to be done in private building yards. Private shipbuilding firms have already facilities for constructing iron or steel vessels, and the encouragement they would derive from extensive Government orders would induce them to extend their plants to meet increasing requirements. If the work of reconstructing the American Navy can be used as an aid to developing the building up of our merchant marine, every encouragement ought to be extended thereto, and the country would gain mutual advantage; but it is only by enabling private firms to extend their shipbuilding operations that this desirable end can be reached. In case of war, it has always been found that maritime nations had to fall back upon private builders for their supply of ships, and it appears to be the obvious duty of our Government to encourage in time of peace the institutions they must rely upon in the event of trouble. Other governments have found that shipbuilding is done more economically by contract than in national navy yards, and the result is not likely to be different in this country. There is an impression that inferior work has in the past been accepted from our private yards, but if this was the case, the naval inspectors were as much to blame as the contractors. With proper inspection, work turned out of private yards is likely to be as good as anything produced in navy yards, and it is certainly cheaper. While the Government can get ships built cheaper in private yards than they can do the work themselves, and the work is quite as good, there is no necessity for a change of policy. When it is found, also, that by giving the work to private firms a most important industry is likely to be stimulated into prosperity, it is decidedly the duty of the Government to have the new navy built in private yards.

Too Much Horse Power for the Money.

Complaints are sometimes made that steam engines are rated by the manufacturer at more power than they will develop, but it is seldom that anything in the contrary direction is heard. The following, from a correspondent, although not in the nature of a complaint, seems to indicate that one builder at least does not rate his engines too high. Our correspondent writes:

There is a portable engine here which the builders rate at 12 horse-power. The cylinder is 7½"x9", boiler pressure, 90 lbs., revolutions per minute, 220. Several here have calculated the engine at about 20 horse-power. Will you kindly explain where the trouble lies?

It seems to us there is no trouble. If well constructed, the engine, under the conditions named, should work at a mean effective pressure of 45 lbs., giving about 20 indicated horse-power. It looks like a case in which the builder furnishes an engine that will be ample for the power guaranteed under accidental fall in steam pressure. It may be commended, if unusual. There are two sides to it, however. An engine large enough to develop 20 horse-power will not work as economically at 12 horse-power as a smaller one. But we do not think there is any cause for complaint.

To Use Electricity for Making Steam.

Should it ever be found practicable to generate electricity direct from the combustion of coal, the steam engine would soon disappear; but till the inventions are perfected that will render the existing expensive methods of producing electricity no longer necessary, there seems to be small prospect of the dynamo superseding the steam engine as a motor to any remarkable extent. In connection with the struggle to improve on existing methods of obtaining power, a recent invention, patented by parties in California, is of curious interest. They do not attempt the Edison feat of making electricity direct from coal without the intervention of a steam boiler, but they propose to make steam by electricity. They propose to seal hermitically the flues of a boiler after having filled each with a coil of platinum wire, which will be in connection with a dynamo. The dynamo sends a current of electricity through the wires, which are arranged to make enough resistance to transform the electricity into heat. That, of course, will make the water boil and generate steam. It is not reported whether or not the inventors expect to make this steam drive the dynamo, and so keep the cycle going, but we fancy this is the expectation.

The trouble with the application of electricity is that its ignorant friends are trying to use electricity for purposes it is conspicuously unfitted for.

The next meeting of the American Institute of Mining Engineers will be held at Chattanooga, Tenn., beginning May 19, and ending May 21.

Combined Industries.

There is something exceedingly attractive and interesting about the metal aluminium, especially about the way parties experimenting with its separation from the ores periodically gull the innocents of the Associated Press into telegraphing startling particulars about the metal all over the country. The latest point where the aluminium revelation comes from is Cleveland where an inventor is reported to be laboring with great promise of producing the metal for $2 or $3 per pound at which figure it can be used for a great many manufacturing purposes such as gun barrels, propeller blades, and possibly bridge and railroad work. There is something that sounds very familiar in the part of the despatch that reads, "aluminium will bear several tons more strains than gun metal, and much more than Bessemer steel." That pure fabrication has been published before and is evidently intended to deceive. The people who get the reports circulated about the production of aluminium may be working faithfully to produce that metal by an improved process, but it looks if they were working up some stock company scheme as a side issue.

Literary Notes.

PRACTICAL ENGINEER AND MECHANIC'S Guide. Containing a Glance at the Early History of Steam; its Application to Pumping; its Later Use for Railroads and Steamboats; its More Extensive Use for General Machinery; the Setting and Management of Boilers; the Modern Steam Engine; How it should be Managed; Description and Application of the Indicator; Illustrations Showing the Advantage of the Engine Being in the Best Possible Condition for Duty; Tables and Rules for Demonstrating the Actual Working of the Engine, with Methods of Correcting the Defects; Rules for Calculations; Tables for Various Calculations Relating to Metals and Other Materials; Tests and Methods of Working Metals; Useful Practical Information; Recipes, etc. By William A. Morrison, Mechanical and Steam Engineer, Lowell, Mass. Published by the Author. Price, Postpaid, $1.

Mr. Morrison, in preparing this work, has drawn from his own experience as an engineer, as well as from the experience of others. No pretension is made of presenting, as a general thing, matter that is entirely new, but the effort has been to put it into available shape. In this he seems to have succeeded to an extent that makes the book well worth the price for which it is sold.

Our esteemed contemporary, the *Railway Review*, of Chicago, announces that it has opened an Eastern department in charge of Mr. Willard C. Tyler, as associate editor. His office is at 102 Chambers street, New York, one block from Broadway and the City Hall. Mr. Tyler was formerly manager of the *Railway Purchasing Agent Company*, of Chicago. He will represent the Eastern field of the *Review*, both in its editorial and business interests. We welcome him to New York, and wish our contemporary the success it well deserves.

John Wiley & Sons, 15 Astor Place, New York, will publish within two months "The Windmill as a Prime Mover," by A. R. Wolff. It will have about 40 illustrations, and the subscription price is to be $3.00 before publication and $3.50 after publication. It will doubtless be a standard work on windmills.

The *Mechanical World*, of London, begins a long review of "Locomotive Engine Running and Management," by Angus Sinclair, by saying: "This is a practical, sensible, and very interesting book, hailing from across the Atlantic; written by an engine-driver who has risen from the foot-plate to the editor's table. * * * In our experience, to turn to many of our modern engineering books for information is to meet with certain disappointment, for just as you fancy you are being led up to the question at issue, the book leaves you there, and the information needed is very carefully omitted. But we believe no one could refer to the present book in search of any instruction respecting locomotive engines, without finding what is required plainly and practically stated." The

review concludes: "It is some time since we read such a thoroughly good book as the one just noticed. We have been delighted with the numerous evidences of the author's painstaking and faithfulness in dealing with apparently trifling matters, upon which, however, very often hang such mighty issues. It is impossible to give a correct idea of the numerous points so practically touched upon by the author, and some of the passages appeared particularly tempting, but knowing that the pages of the *Mechanical World* were not elastic we were unable to quote them. We therefore strongly urge all who are in any way connected with, or even interested in, the locomotive (and who, indeed, is not?), to purchase this practical work and read it for themselves. It will be impossible for any one to study this work without reaping some benefit."

The American Society of Mechanical Engineers will hold their Spring meeting at Atlantic City, N. J., on or about May 26. Papers to be read at the meeting are required to be in the hands of the secretary at least four weeks previous to the meeting. A report on "Standard Methods of Conducting Boiler Tests" will come up for adoption. The headquarters of the society are now in the Stewart Building, on Broadway corner of Chambers Street, New York.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(140) W., Belleville, Ill., asks: What is the correct pitch for gas pipe from one to two inches? *A.*—11½ threads per inch.

(141) W. E. M., Calais, Me., asks: What is the best material for stern bearing for a tug boat; cylinder, 18"x18"; shaft, 5" diameter? *A.*—We do not know of anything better than lignum-vitæ.

(142) H. L. U., Champaign, Ill., asks: Suppose the bolts of a cylinder head to be screwed up so as to thereby give them a certain initial tension. Now, if steam be admitted to the cylinder, would the strain on the bolts be increased to an extent equal to that due to the steam pressure? *A.*—There would be no additional strain on the bolts until the pressure in the cylinder equaled the initial tension on the bolts.

(143) W. S., Newark, N. J., asks: What is the best cement for pipe threads? I have always used red and white lead and boiled oil, but should like something that would dry quicker. *A.*—We consider the cement named by you the best for the purpose, and never found any difficulty with its drying. You could mix dry lead with painter's dryer, and it would dry quicker, but would not be so good for the purpose.

(144) P. C., Hampton, Va., writes that he is about to construct a large cistern, or rather well, about 20 feet diameter and 19 feet deep; that stone is hard to get, and asks how he shall build it, how cover it, and how long, with 10 feet of water in it, can I pump from it at the rate of 100 gallons per minute? *A.*—We should suppose a good way would be to construct it of hard-burned brick, laid in cement, using a few stones at bottom, and cover with brick arch. You could build it of plank, but they would not last as long as brick. Any good civil engineer in your vicinity, with an exact knowledge of the soil, will be able to give you information that will save money for you, and perhaps save a failure. Such a well, with 10 feet of water in it, if none runs in during the time, would be emptied, pumping 100 gallons per minute, in a little less than four hours.

(145) W. L. H., Wallula, Washington Ter., writes: 1. In the AMERICAN MACHINIST of June 7, 1884, Angus Sinclair says that the eccentric rods should not be crossed when the engine is on the front center. What effect does it have on the valve motion if the rods are crossed? *A.*—If the valve motion is arranged to work with the rods crossed when the crankpin is on the front center, the lead diminishes as the link is hooked up. 2. How long a steam pipe can I safely use in one line without an expansion joint? *A.*—It will depend upon size of pipe, conditions as to rigidity of connected parts, and other considerations that must be considered for each individual case. 3. What became of that scheme of pumping water 37 feet by suction, which appeared in the AMERICAN MACHINIST some time ago? *A.*—We have no information on the subject further than published at that time.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Edw. Sears, wood engraver, 48 Beekman, St., N.Y.

Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John street, N. Y.

Tools for amateur and foot-power lathes. Send for illustrations. Hartford Tool Co., Hartford, Ct.

10,000 Kellam's Steam Damper Regulators in use is a guarantee of their value. See cut, page 12.

Light fine interchangeable mach'y to order. Foot lathe catalogue for stamp. E. O. Chase, Newark, N.J.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

Universal grinders for lathe-centers, chucks, angles, or cylinders. C. C. Hill, 84 Market st., Chicago, Ill

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Engineers, send for sample Eureka Packing. Will please you. Hine & Robertson, 12 Cortlandt St., N.Y.

Split pulleys cheaper than plain ones. Trial orders solicited. York & Benton, Cleveland, Ohio.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Would like to exchange traverse shaper for 36" engine lathe. Address The Hendey Machine Company, Torrington, Conn.

A few chucks, of all kinds, for sale at half price. Slightly damaged. Send for list to the maker, A. F. Cushman, Hartford, Conn.

Improved Tack Machinery, made by The Willets Man'f'g Co., can be seen in operation at their works, 57 Clifford St., Providence, R. I.

The outline ("wax process") engravings shown in the AM. MACHINIST each week are made by Struthers, Servoss & Co., 32 Frankfort Street, N. Y.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large: prices low. Frasse & Co., 62 Chatham St., N. Y.

Farley's Reference Directory of the Machinists, Iron, Steel, and Metal-Working trades of the United States. A. C. Farley & Co., Philadelphia, Pa.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

"Complete Practical Machinist," $2.50; "Mechanical Drawing Self-Taught," $4. Books for workmen Joshua Rose, Box 3306, New York City.

Locomotive Engine Running and Management. By Angus Sinclair. Price $2. An excellent book for men interested in steam engineering, valve setting, designing valve motion, the care of the Westinghouse brake, etc. Published by John Wiley & Sons, 15 Astor Place, N. Y.

Every young man who aspires to be either a mechanic, merchant, or manufacturer, owes it to himself that he become thoroughly familiar with the writings of Chordal. John Wiley & Sons, 15 Astor Place, N. Y., have issued a new and enlarged 12 mo. edition of "Extracts from Chordal's Letters." Handsomely bound in cloth, with over 50 illustrations. Price, $2. Discount of 25 per cent. on orders for five or more copies.

MANUFACTURES.

B. F. Fields, Nashville, Tenn., will establish a carriage factory.

J. H. Rucker will erect a cotton compress at Athens, Ga., to cost $30,000.

The Charles G. Stifel Brewing Company, St. Louis, will erect a $25,000 brewery.

A hollowware foundry is to be started by N. J. Anderson & Son, Knoxville, Tenn.

Smith & Fenn, Atlanta, Ga., will put in more machinery in their machine shop.

Tolhurst & Son, Troy, N. Y., are building a five-story addition to their machine shop.

Joseph Naylor, 107 Duane Street, New York, will erect a $25,000 brick factory at 55 Beach Street.

F. C. Miller, of South Paris, Me., will soon make extensive repairs and improvements to his iron foundry.

L. Candee & Company, New Haven, Conn., will build an addition three stories high to their rubber factory.

Hammond & Jamison, carriage manufacturers, Foxcroft, Me., will put in a 25 H. P. steam engine next summer.

The Pratt Manufacturing Company are to erect a large cooperage shop at North 11th and 1st Sts., Brooklyn, N. Y.

Efforts are being made to induce the Memphis & Charleston Railroad to build their machine shops in Tuscumbia, Ala.

Copp Bros. & Barry Engine and Machine Works, Hamilton, Ont., will be reorganized into mining machinery works.

Chess, Cooke & Company, nail and tack manufacturers, Pittsburgh, Pa., will erect a new rolling mill at Homestead.

Parties are soliciting stock for a new woolen mill to be erected at East Madison; over $7,000 have already been subscribed.

The New York Lumber and Wood-Working Company, 22 Cortlandt Street, New York, will erect and equip a new planing mill.

It is reported that the Fort Worth & Denver Railroad will erect a roundhouse, and possibly machine shops, at Harrold, Texas.

Dansby & Brown, Tyler, Texas, are building works at a cost of about $20,000, to manufacture a new style cotton compress.

The Board of Sanitary Trustees, Jacksonville, Fla., will replace the engine at the city water works with a large compound engine.

The Kansas City, Fort Scott & Gulf Railroad will erect a boiler shop in Kansas City, Mo., adjoining their machine shop, to cost $7,500.

R. L. Cofran, proprietor of the Western Foundry and Machine Works, Topeka, Kansas, will make some improvements in his shop this spring.

E. W. Bliss, Brooklyn, N. Y., is employing 100 more machinists than a month ago, owing to receipt of new orders from a variety of sources.

Work in making ready the watch factory at Williamstown, Mass., is progressing rapidly, and they expect to begin running about the 1st of May.

Scott, Spinney & Company, carriage manufacturers, Amesbury, Mass., who were recently burned out, will start a new factory with new equipment.

John I. Lewis will erect at 1270 East Thompson Street, Philadelphia, a linseed oil mill. There will be two buildings, one 30x85 feet, and the other 85x90 feet.

The Sioux City (Iowa) Foundry and Machine Works, incorporated last year, are now building Corliss engines and making heavy machinery and castings.

A correspondent writes us that C. Schrack & Co., Philadelphia, Pa., manufacture a white spirit varnish for drawings, which is excellent for the purpose.

Arrangements are being made by capitalists to purchase the works in Baltimore of the Abbott Iron Company, and run them on a large scale as a steel works.

Milliken & Smith, 95 Liberty Street, New York, will build new chimney stacks, boiler house, and other additions to factory on Ninth Avenue, at a cost of $100,000.

The Pratt Coal and Coke Company, of Birmingham, Ala., owners of the Alice furnaces, it is reported, have determined to erect two new furnaces near Birmingham.

F. M. Leader & Company, Williamsport, Pa., have undertaken the manufacture of axles and other forgings. They will fit up the old Catawissa freight station for a shop.

L. P. Ewald, president of the Ewald Iron Company, Lyons County, Ky., contemplates removing his rolling mill to Paducah, Ky., and spending $200,000 on new works.

A. M. Collins, Son & Company, will erect a five-story brick factory, 120x241 feet, corner American and Oxford Streets, Philadelphia, with other supplemental buildings.

The item recently started on the rounds of the press that the Ames Company, of Chicopee, Mass., had received an order for 200,000 swords, is without any foundation in fact.

All the water power mills and factories at Lowell, Mich., were shut down last week by high water, and will probably remain so for some time.—*Grand Rapids Morning Telegram.*

The firm of Skinner & Wood, Erie, Pa., has been dissolved by mutual consent. The business will be conducted in the future by Le Grand Skinner as the Skinner Engine Company.

Northern capitalists are investigating the advantages of Hickman County, Tenn., for iron manufacturing, with a view of building a $150,000 furnace there.—*Baltimore Manufacturers' Record.*

The Allentown Wagon Platform Company, 136 South 5th Street, Allentown, Pa., are erecting a two-story brick building on the northwest corner of 5th and Lawrence Streets, Allentown, Pa.

Hersh & Brothers, 806 Hamilton Street, Allentown, Pa., manufacturers of stoves and tinware, will enlarge their works and will put in a full set of machinery for making galvanized iron cornices.

Hussey, Howe & Co., Pittsburgh, are introducing natural gas into all departments of their steel works, and in a short time no coal will be used for any purpose except at the blacksmiths' forges.

The Silsby Manufacturing Company, Seneca Falls, N. Y., have issued a fine new catalogue of the Silsby steam fire engine, Holly rotary pumps, Silsby heater and fire department supplies. The catalogue is fully illustrated.

The Board of Trade of Hannibal, Mo., has put on foot a movement to organize a company in that city for the purpose of manufacturing stoves. A committee of seven has been appointed to secure subscriptions to the stock.

The tack factory of White, Cheney & Neff, at Taunton, Mass., which was recently destroyed by fire, will be rebuilt on the old site, by J. H. Eddy, who owned the burned building. The new factory will be much larger than the old one.

Parties from Detroit, Mich., recently visited Aurora for the purpose of selecting a site for a factory for manufacturing white bronze granite and marble for use for monumental purposes. The new concern will be styled the Detroit Bronze Company.

S. W. Goodyear writes us: "Many of our Waterbury shops are unusually busy, not simply running full time, but treating us to the sound of escaping steam and the hum of machinery till 9 or 10 o'clock in the evening. We like this, and hope it will continue and increase."

York & Benton, successors to S. M. York & Co., Cleveland, Ohio, are about to open large new warerooms for the display of machinery. They have leased one entire block near their old stand, and have bought out the machinery business of Albert Fisher. Iron-working machinery will be their specialty.

William Lowe (Bridgeport Boiler Works), Bridgeport, Conn., reports lively orders for Lowe boilers and feed-water heaters. The New York office of this establishment (L. M. Moyes, general sales agent) has been removed to 52 John Street. The Pond Engineering Company has taken the St. Louis agency for the Lowe feed-water heaters.

The *National Labor Tribune* says: The Baldwin foundry, at Chattanooga, Tenn., is experimenting with colored men at 50 cents per day, and $20 bonus at the end of the first year. To beat them out of the $20 it is alleged that when they lose a day from any cause the boss charges them $1, or double the amount of wages paid them while working.

The Goulds Manufacturing Company, Seneca Falls, N. Y., have issued a pocket catalogue of their pumps, engines, rams, hydraulic machinery and iron goods. It contains prices and illustrations. They have also in press a large catalogue which they expect to have ready very soon. Some new pumps have been added to their list of goods.

Jones & Laughlins, Pittsburgh, Pa., have issued, under date of April 13, a new price-list of their patent cold rolled shafting (steel and iron), couplings, pulleys, hangers, jib cranes, etc. They announce that a large reduction in prices has been made throughout the entire list, and that the high excellence of their production will be maintained. The price-list is well printed and illustrated. It is pocket size.

The National Pulley Covering Company, of Baltimore, are making a covering for pulleys from ground cork, or cork and wood pulp in a plastic condition, spread on a strong backing of jute. To all appearances the face is similar to linoleum, and the surface is such as to prevent the belt from slipping. On the pulley, or jute side of the covering, a cement is spread that has peculiar adhesive properties. They have applied this covering quite extensively, with good results.

George Holmgreen & Sons, Alamo Iron Works, San Antonio, Texas, write us: We are about to move into our new quarters. Foundry, 30x80 feet, with 36-inch cupola; machine shop, 35x40 feet; blacksmith shop, 20x34 feet, office and storeroom 20x36 feet, all built in modern style. We have full railroad facilities. The bulk of our work is architectural, but we also do machine repairing. We are about to complete the Maverick Bank, where we placed 139 columns. Contract, $15,000.

The Beckett & McDowell Manufacturing Company, 120 Liberty Street, New York, have just finished over 100 tons of machinery for the firm of Barazarte & Castro, of Chili. The plant consists of three large water jacket furnaces, a large double hoisting engine, and complete outfit, consisting of boilers, engines, cars, cages, skips, etc. To this plant Senor Castro, the representative of the company here, has added a large air compressor plant, with drills, etc., furnished by the Rand Rock Drill Company, of New York. Senor Castro has placed his orders here after careful examination of machinery as made for the purpose in various countries, and as there are many large and valuable properties in Chili and adjacent countries needing development, the result of the working of this machinery will be watched with a good deal of interest, it being under the superintendence of thoroughly practical men. If successful, as we have no doubt it will be, it will undoubtedly lead to large orders from that market for American machinery. Senor Castro's complete shipment of machinery and supplies will aggregate about 500 tons. The Beckett & McDowell Co. are very busy at their manufactory filling orders for Mexico, Central and South America, and for the home trade. They have several orders on hand for refrigerating machinery, of which they have made a specialty for several years, and have just finished a contract for power plant, in connection with the Brush Electric Light Company, of Philadelphia, for the Coney Island Olympian Club, for a roller skating rink at Philadelphia.

Members of the publishing firm of Root & Tinker, *Tribune* Building, New York, and others, have organized The Tubular Blade Company, headquarters at Short Hills, N. J., to place upon the market by manufacture or royalty steel scythes, stiffened by a "tubular blade," instead of the ordinary back. They claim a marked saving in cost of manufacture.

Machinists' Supplies and Iron.

NEW YORK, April 16, 1885.

There has been no notable change in the supply trade since our last report was made. Business drags along in a quiet way, and the expected improvement comes so slowly as to be scarcely perceptible.

Iron—The market for pig continues to have all the features seen for the last year. A fair volume of business transpires, but prices keep low, and buyers insist in merely supplying weekly needs. Men who could buy supplies to keep them going for months persist in taking only what will keep them going for a few days. For the best brands the price holds up, but inferior brands may be bought at concessions. Standard Lehigh brands are quoted at $18 to $18.50, for No. 1 X Foundry; $17 to $17.50 for No. 2 X, at tidewater, and $14.50 to $15.50 for Grey Forge.

Scotch Pig is unchanged, business dull and quotations nominal. We quote Shotts, $21.50 to arrive; Coltness, $21.50 to arrive; Glengarnock, $19 to $19.50 to arrive; Gartsherrie, $20.50; Summerlee, $20.50; Carnbroe, $19 to arrive; Eglinton, $18 to $18.50; Langloan, $21; and Dalmellington, $19.

Copper—A fair business has been done in ingot during the week. Lake sold at 10⅞ cents, and Arizona at 10½ cents.

Lead—This market has ruled dull. Trifling sales have been made at 3.60 cents.

Tin—Spot has ruled firm, with light sales. We quote for jobbing lots Banca, 18⅛ to 18¼; Straits and Malacca, 17.75 cents.

✻WANTED✻

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Position wanted—supt or chief draftsman. Address J. C. S., AM. MACHINIST.

Situation by first-class patternmaker accustomed to make working drawings. T. C., AM. MACHINIST.

Wanted—Situation as foundry supt. or foreman. Address D. E., AM. MACHINIST.

Wanted—Position by a patternmaker. Address H. G., Saginaw Mich.

Mech. draftsman competent of making accurate and neat drawings, also some designing, wants situation. Address O. M., AM. MACHINIST.

Wanted—Situation as foreman or superintendent of machine shop; good recommendations. Address Lock Box 568, Philadelphia, Pa.

Wanted—A competent working machinist as assistant foreman in shop running on small engine work in a Western city. State experience and wages expected. Address B. M., AM. MACHINIST.

A mechanical engineer, with 23 years experience in good shops, desires superintendency of works manufacturing stationary engines, general machine work or machine tools. Unexceptionable references. Address Planimeter, AM. MACHINIST.

Wanted—First-class shaft turner: man who can turn out lots of work per day. State ability, wages required, and tools he is accustomed to. Address Mill Builder, Box 7, AM. MACHINIST.

Wanted—A competent engineer to take principal charge of the engines, boilers, and steam heating plant of a large manufacturing establishment in Philadelphia. Must be thoroughly conversant with use of the indicator, and well informed on steam matters generally. A suitable man will secure a permanent and desirable position. References required. Address Quaker City, care AM. MACHINIST.

For Sale Cheap—A lot of finished hexagon nuts, ¾ standard, case-hardened. Box 814, Pittsburg, Pa.

Wanted—Present address of T. R. Bell. Send to L. Bartlett, M. M., Missouri Pacific Railway, St. Louis, Mo.

Wanted—Partner with $3,000 to $5,000 in machine shop; business been established five years, and well advertised. P. O. Box 54, Chattanooga, Tenn.

For Sale—The patent of a new lathe and drill press chuck, as illustrated page 4, last number of AMERICAN MACHINIST. Address George Birkmann, 258 West 29th Street (Top Floor), New York.

To make room for larger tool, will sell cheap, for cash, a planer 42"x42"x12', in good order. Address P. O. Box 3085, Bridgeport, Conn.

Wanted—The right party to take an interest with me in my very extensive works - machine and boiler shop and foundry. Address E. R. Smith, Jackson, Mich.

To Manufacturers of Steam Engines—Drawings of a new design of automatic cut-off engine, with several valuable improvements, can be had by addressing "Inventor," AM. MACHINIST.

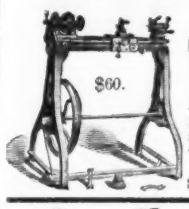
Foundry to Rent in West Chester—A rare chance for a first-class foundryman with small capital. The owner offers a fully-equipped iron foundry with power. His machine shops are connected, and use from five to six thousand dollars worth of castings per year. Address Box 2107, West Chester, Pa.

ROOFING.

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free. Agents wanted. T. NEW, 32 John Street, New York

CHANDLER & FARQUHAR,

168 Devonshire Street,



BOSTON, MASS.

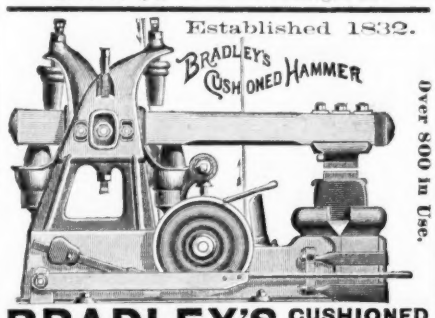
TOOLS AND SUPPLIES

FOR

Machinists, Plumbers, Gas Fitters, Electricians, Model Makers, Roller Skate Makers, Amateurs, Etc.

Send for Catalogue B.

Established 1832.



BRADLEY'S CUSHIONED HAMMER.

Stands to-day without an Equal.

It approaches nearer the action of the Smith's Arm than any Hammer in the WORLD.

SPECIAL NOTICE.

All parties making, selling or using an Upright or Helve Power Hammer having a Cushioned Vibrating Saddle, infringe our patents, and we shall hold them legally liable for the same.

BRADLEY & COMPANY, Syracuse, N. Y.

H.W.JOHNS' ASBESTOS PACKING.

Our improved elastic Asbestos Piston Rod Packing is made from the best quality of pure Asbestos fiber and is the most perfect, compact, and durable Packing ever produced for locomotive, marine, and other engines.

Asbestos Wick Packing,
Asbestos Mill Board and Sheathing,
Asbestos Gaskets and Rings,
Asbestos and Rubber Tape and Cloth.

Asbestos Boiler Coverings.

Our Asbestos Cement Felting is the most effective and durable Non-conducting covering for Steam Pipes, Boilers, Stills, and other Steam-Heated Surfaces.

Asbestos Hot Blast Cement Felting,
Asbestos Air Chamber Covering,
Asbestos Locomotive Lagging,
Asbestos and Hair Woven Felt,

ASBESTOS ROOFING.

Asbestos Building Felt.

Asbestos Cloths, Cord, Twine, Yarn, and Sewing Twine, Asbestos Gasket and Retort Cements, etc.

LIQUID PAINTS, and PURE COLORS.

DESCRIPTIVE PRICE LIST AND SAMPLES FREE.

H. W. JOHNS M'F'G CO.,

Sole Manufacturers.

87 Maiden Lane, New York.

175 Randolph St., Chicago. 170 N. 4th St., Philadelphia. Billiter House, London.

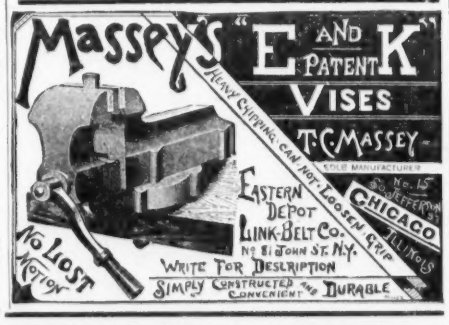
STEPHENS PATENT PLANER CHUCKS

Combine valuable features offered by no other tool. In range of opening; advantage of self-adjusting jaw worked by a single screw; graduated base, etc. Parts interchangeable. Chucks guaranteed. Sold by the trade. Send for Catalogue.

Self-Adjusting.

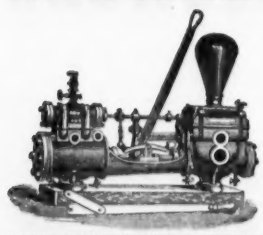
MELVIN STEPHENS, Prop'r, Office, 41 Dey Street, New York.

Massey's "E AND K PATENT" VISES



KNOWLES PATENT STEAM PUMPS.

THE STANDARD!



THE BEST MADE PUMP! THE BEST PUMP MADE!

Estimates furnished on application for Pumping Machinery of any capacity, and to work against any pressure.

Air Pumps and Condensers for steam Engines a specialty. Will save from 20 to 30 per cent. fuel.

SEND FOR ILLUSTRATED CATALOGUE.

—ADDRESS—

KNOWLES STEAM PUMP WORKS,

93 Liberty St., New York, and 44 Washington St., Boston, Mass.

The Deane Steam Pump Co., HOLYOKE, MASS.

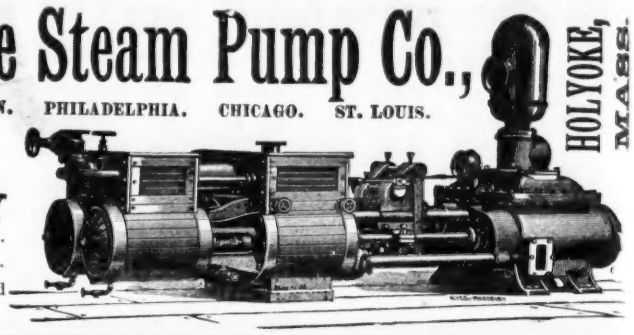
NEW YORK. BOSTON. PHILADELPHIA. CHICAGO. ST. LOUIS.

MANUFACTURE

PUMPING MACHINERY

FOR ALL DUTIES.

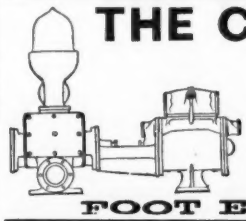
Send for New Illustrated Catalogue.



THE CAMERON STEAM PUMP.

STANDARD OF EXCELLENCE.

30,000 IN USE.



MANUFACTURED SOLELY BY

The A. S. Cameron Steam Pump Works,

FOOT EAST 23d ST., NEW YORK.

Established in 1874.

CLEVELAND TWIST DRILL CO.

24 and 26 West Street, Cleveland, O.
101 Chambers Street, New York.
85 Queen Victoria St., London, Eng.

NOTICE OF SALE.

Having disposed of my patents, drawings, patterns, tools, goodwill and everything connected with my milling machine business to the BROWN & SHARPE MFG. CO., of Providence, R. I., I refer further orders and inquiries to them.

Thanking the public for past favors, I am very respectfully,

March 10, 1885.

C. E. LIPE,
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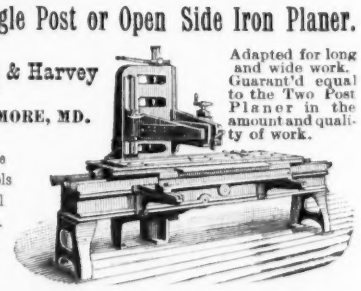

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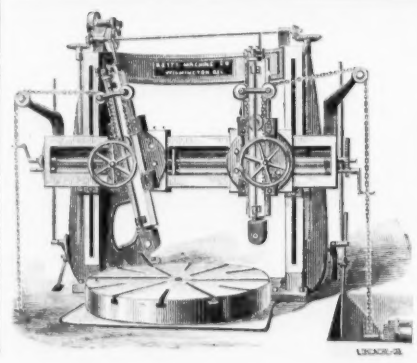

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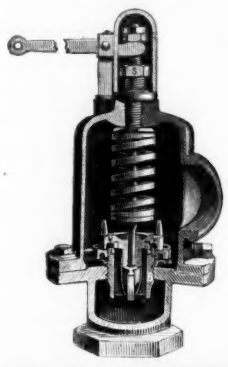

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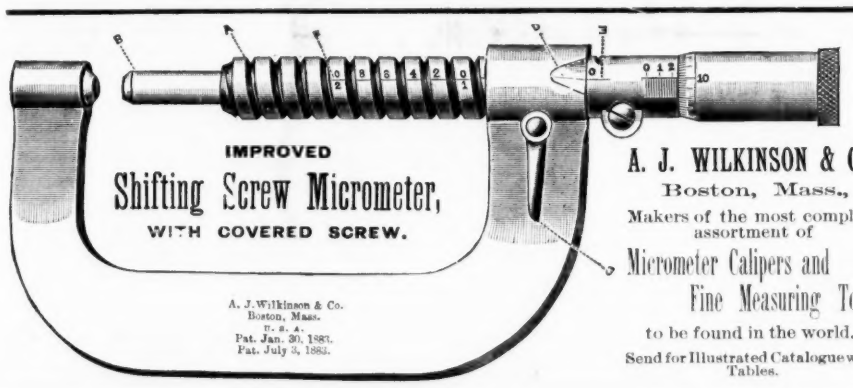

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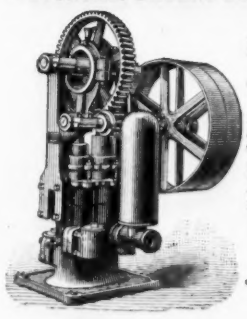

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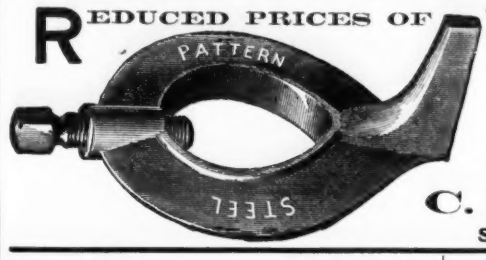

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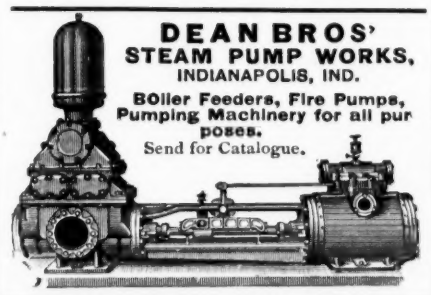

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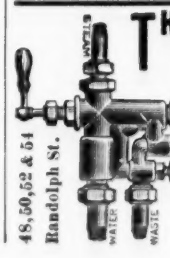

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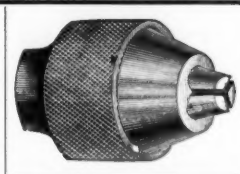

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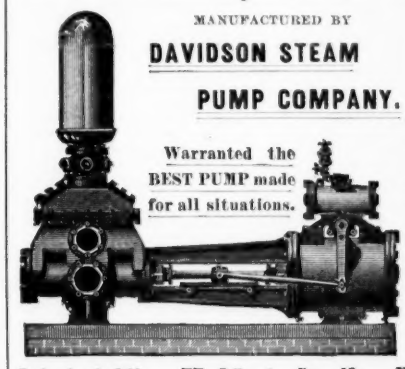

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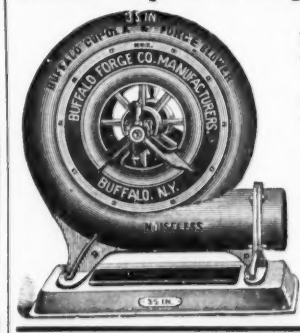

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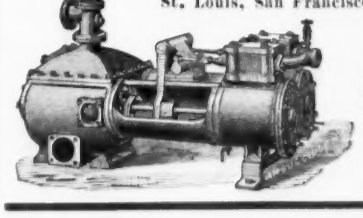

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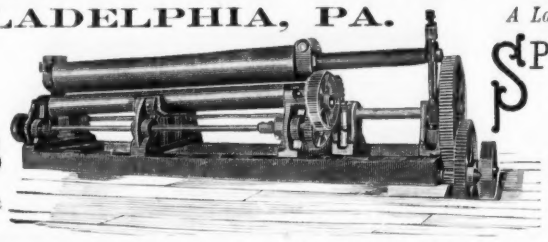

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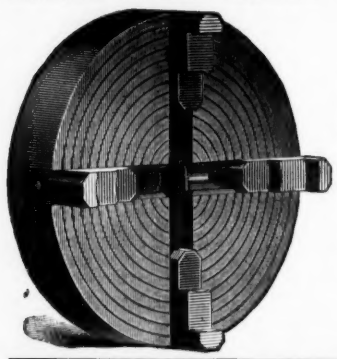

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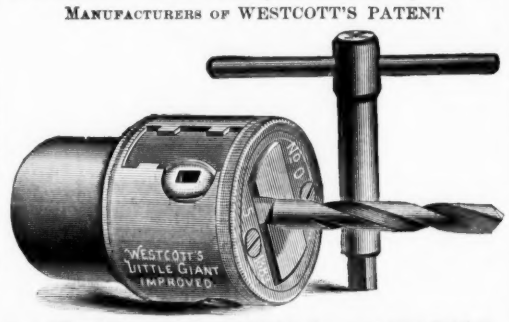

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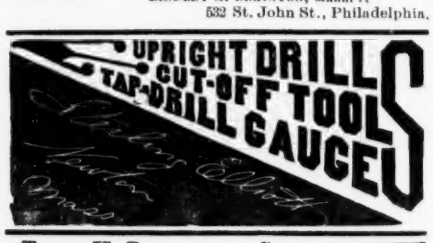

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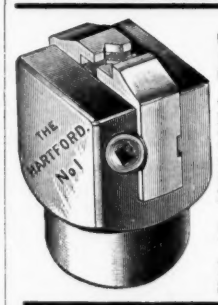

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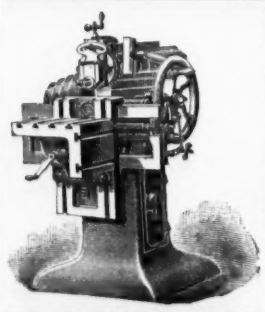

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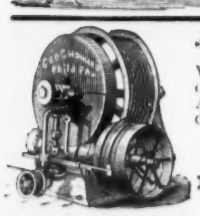

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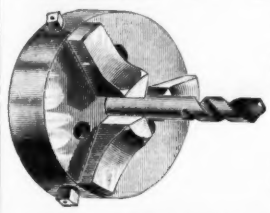

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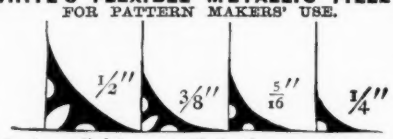

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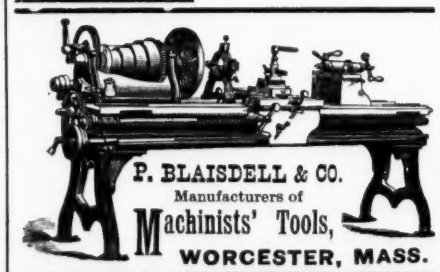

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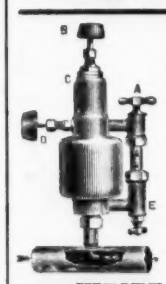

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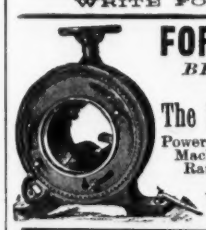

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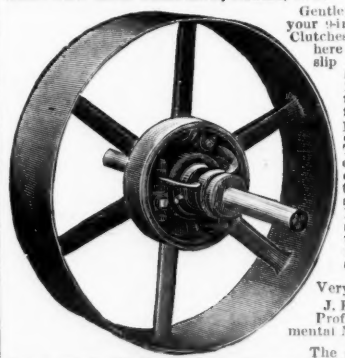

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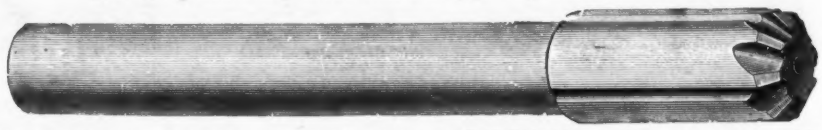

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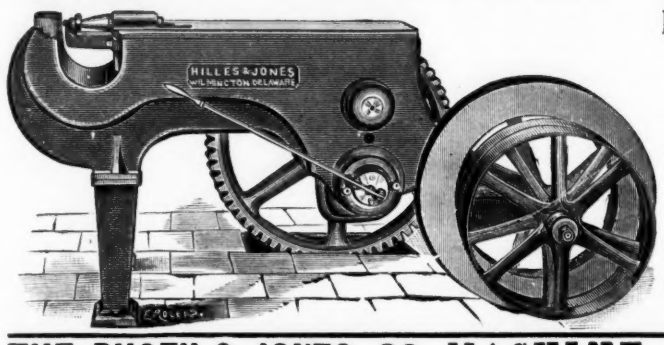

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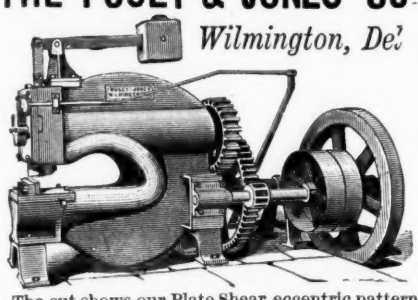

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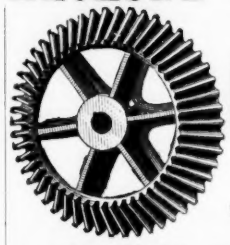

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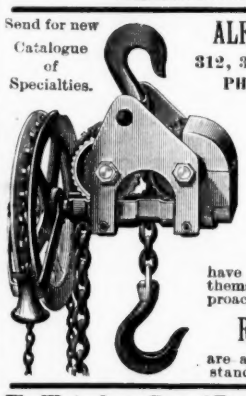

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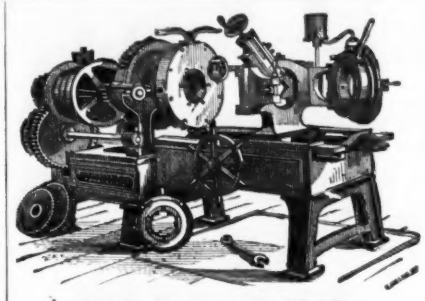

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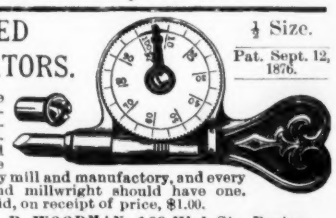

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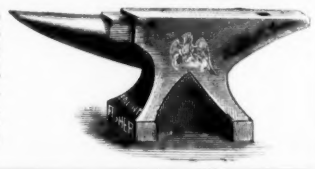

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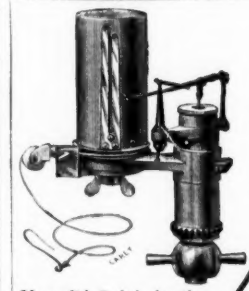

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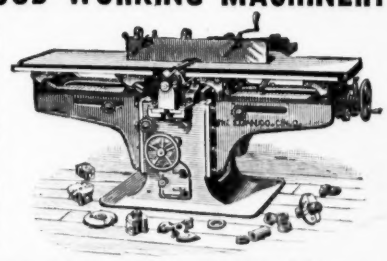

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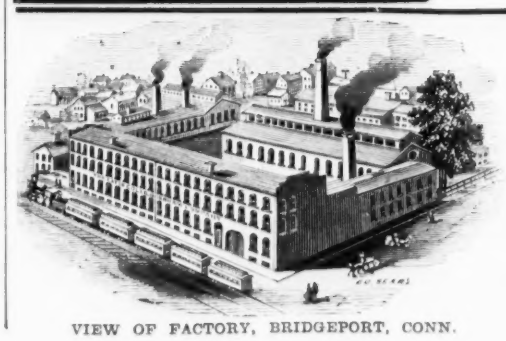

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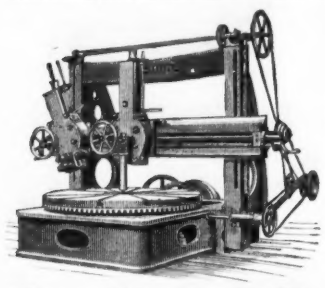

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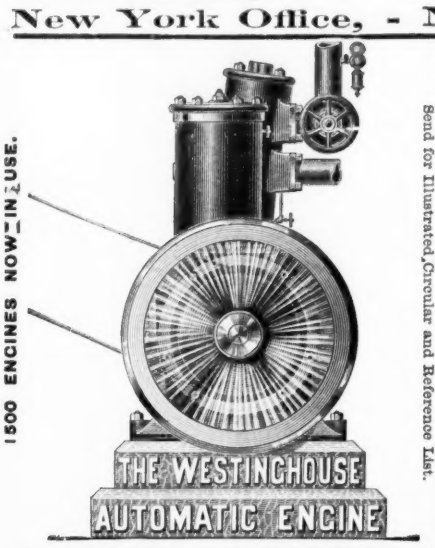

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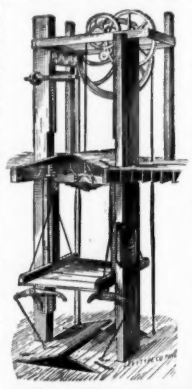

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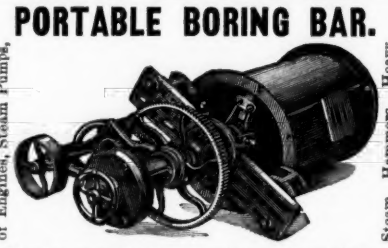

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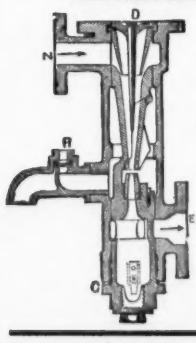

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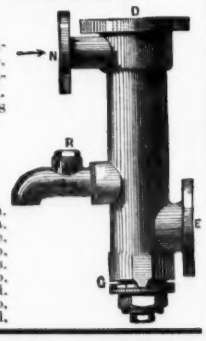

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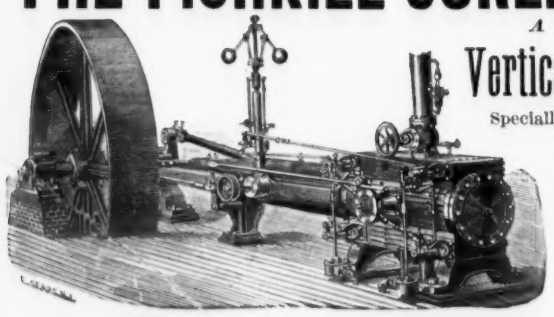

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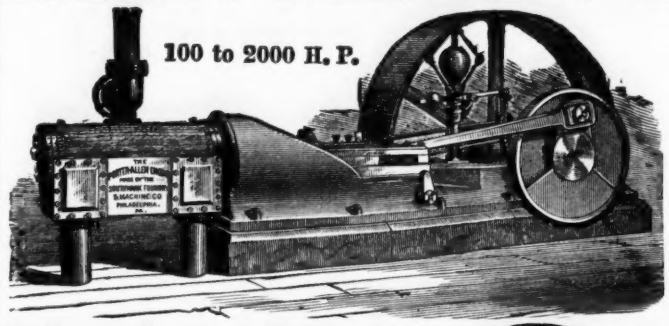

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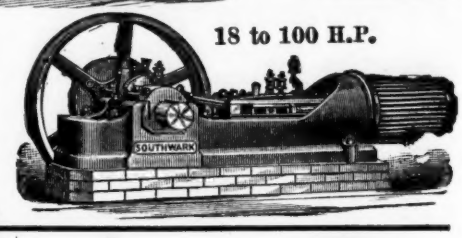

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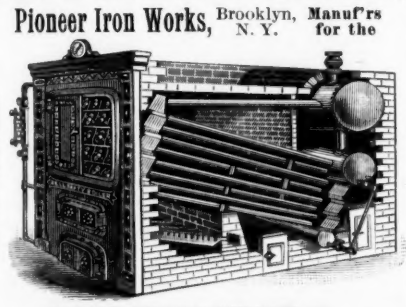

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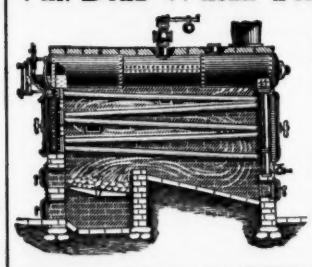

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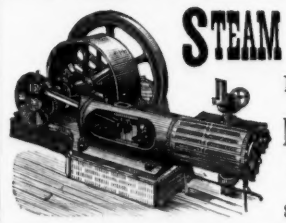

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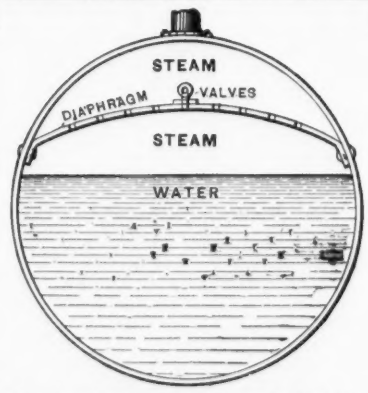

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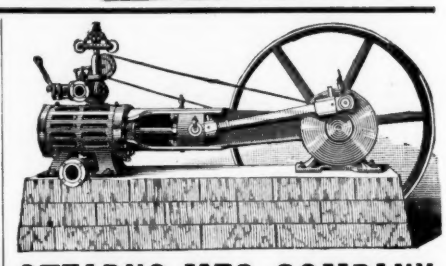

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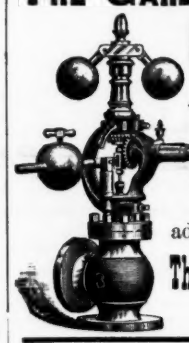

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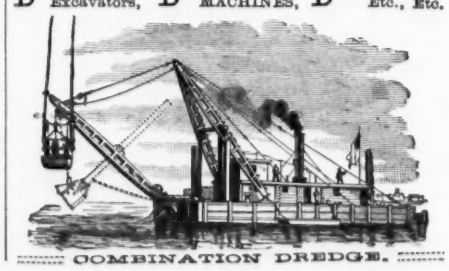

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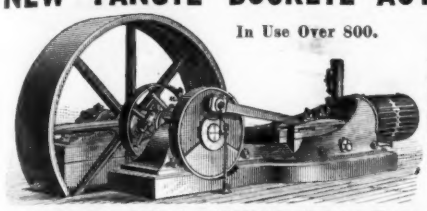

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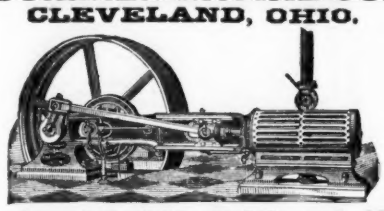

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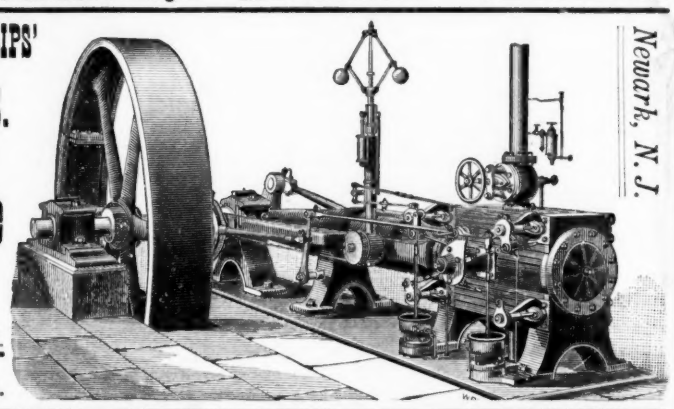

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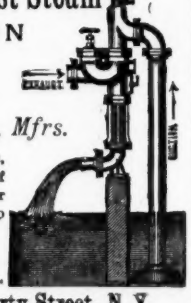

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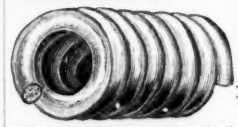

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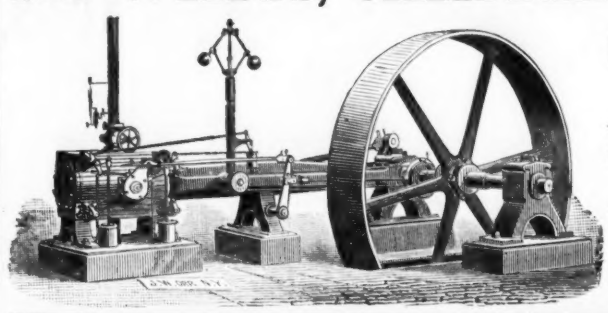

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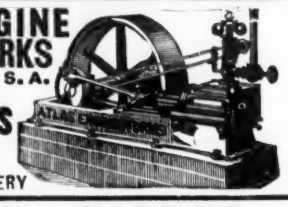

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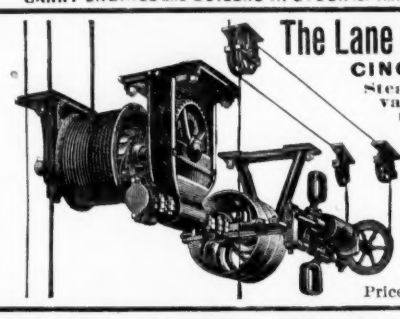

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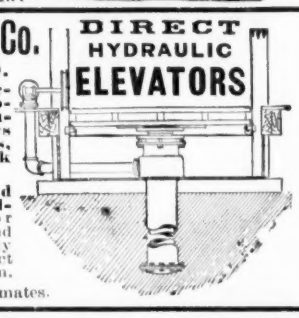

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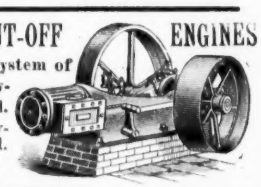

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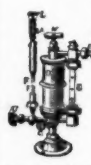

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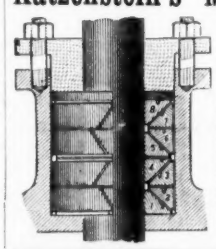

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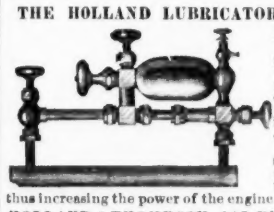

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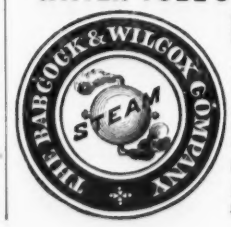

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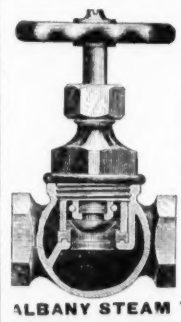

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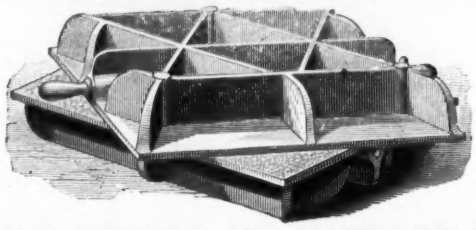

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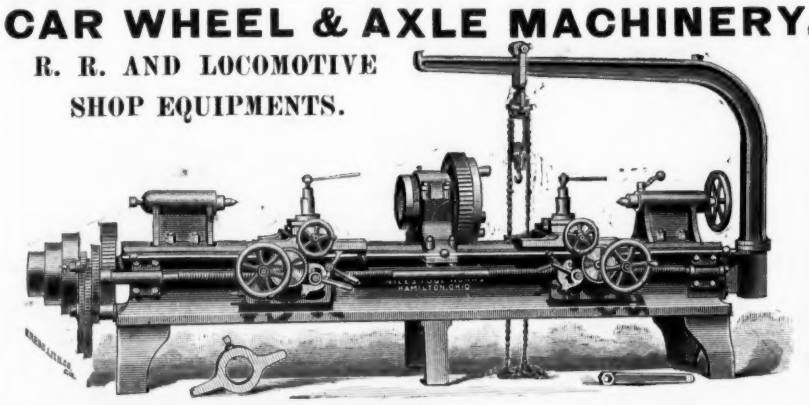

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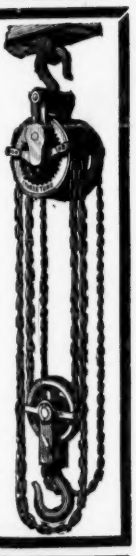

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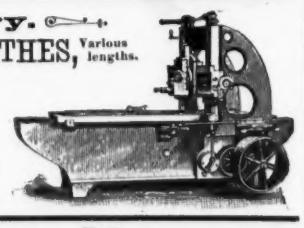

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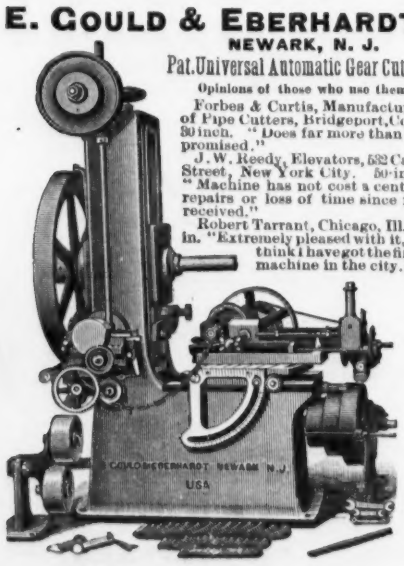

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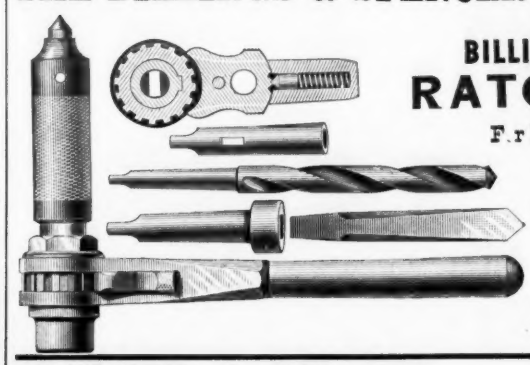

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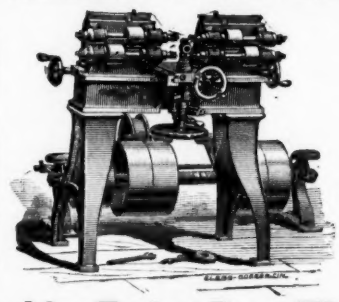

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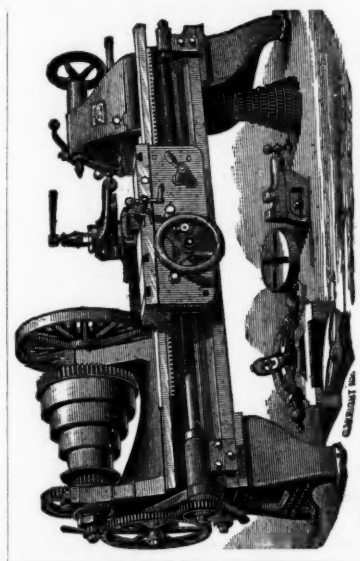

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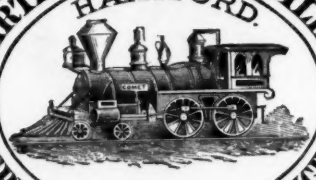

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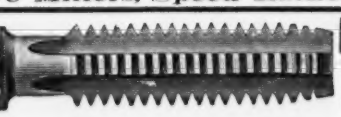

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